Operating instructions

Universal drilling and milling machines

Version of February 2009

F1200 – F1200 high speed
CC-F1200 – CC-F1200 high speed

F1210 – F1210 high speed
CC-F1210 – CC-F1210 high speed

F1410 LF – F1410 LF high speed
CC-F1410 LF – CC-F1410 LF high speed

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Dear customer!

Congratulations on choosing the **WABECO Universal Drilling and Milling Machine**. We have taken great care in its manufacture and we have given it a thorough quality control test. These operating instructions are to help you to work with it safely and properly. Therefore we request that you read the respective instructions carefully and follow them exactly.
After unpacking the machine please check to see if any kind of damage has occurred during transportation. Any complaints must be made immediately. Complaints made at a later date **cannot** be accepted.

If you have any questions or need any spare parts, please quote the machine number located on the front of the motor (see rating plate).

Disposal of the drilling and milling machine

The transport and protective packaging is made by means of the following materials:

- corrugated cardboard
- polystyrene free of freon
- polyethelene foil
- non-returnable wooded pallet (untreated)
- Euro pallet (deposit)

If you have no further need of these articles or do not wish to use them again, please dispose of them at the public recycling facilities.

The drilling and milling machine consists up to 98% of recyclable materials, i.e. steel, cast iron, aluminium and 2% of chemical materials, e.g. the coating of electrical leads, printed circuits.
If you have trouble in disposing of these parts in a proper manner, we would be pleased to help you: upon mutual agreement we will take the complete machine back and dispose of it.
However, the costs for transporting the machine to our plant must be at your expense.

EC – Conformity Declaration

In the name of the manufacturer

Walter Blombach GmbH

Tool and Machine Factory
based in Remscheid and Neuerburg

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We hereby declare that the universal milling and drilling machines specified below

Universal milling and drilling machine Typ:
F1210 E
F1210E high speed
CC-F1210 E
CC-F1210 E high speed

meet the following regulation requirements for standard series production

- **directive for machines 98/37 EG**
- **low voltage directive 73/23/EWG**
- **EMV directive 89/336/EWG**

In order to meet / implement the requirements of the above mentioned directives, the following applicable and previously published standards have been adhered to:

EN ISO 12100-1
EN ISO 12100-2
EN 12840
EN 60204-1

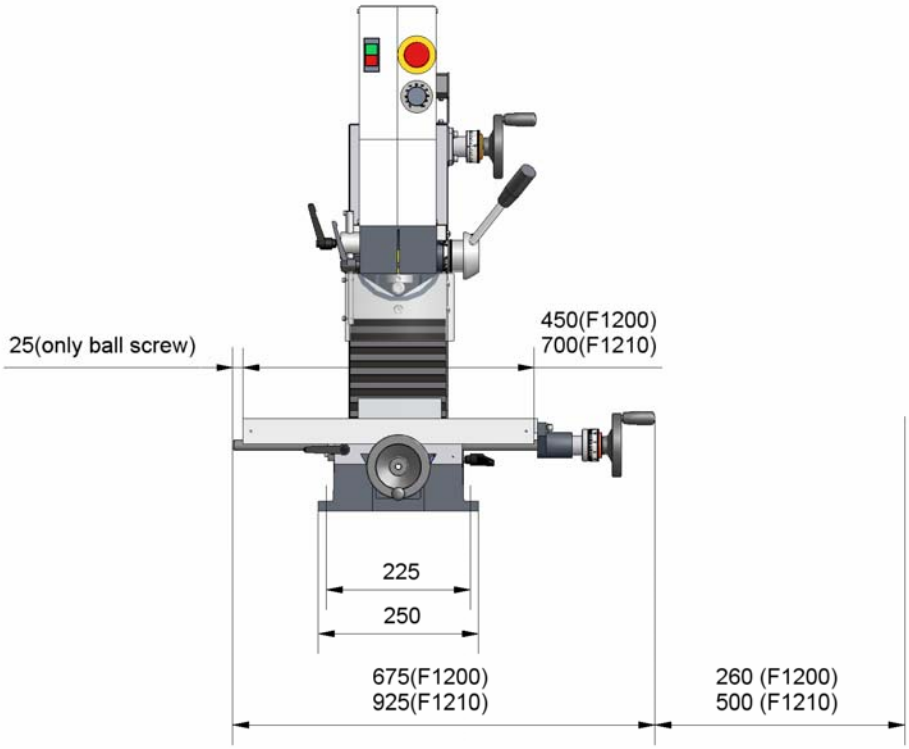
D-54673 Neuerburg

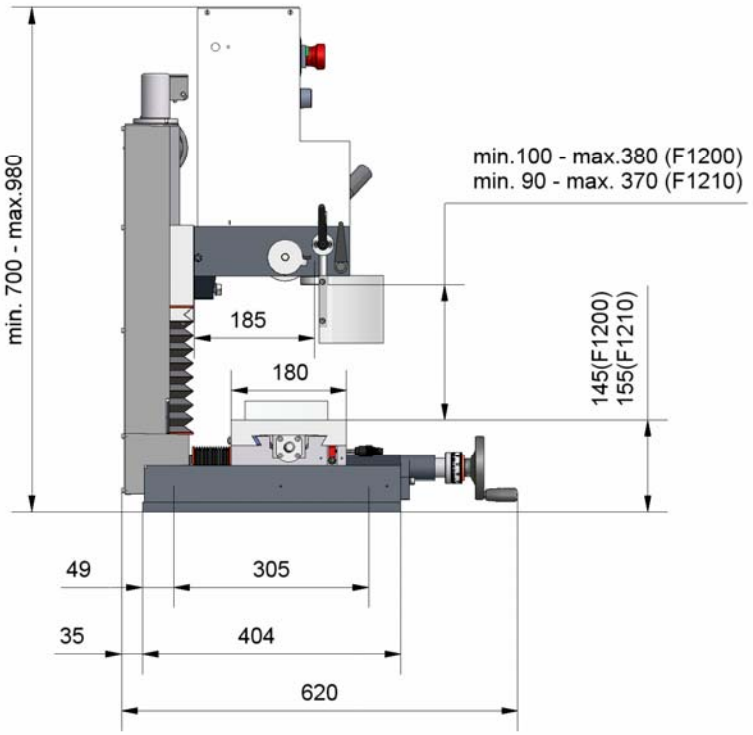
City

Signature

1. Dimensions

1.1 F1200, F 1210 with trapezoid thread spindle or ball screw





1. Dimensions

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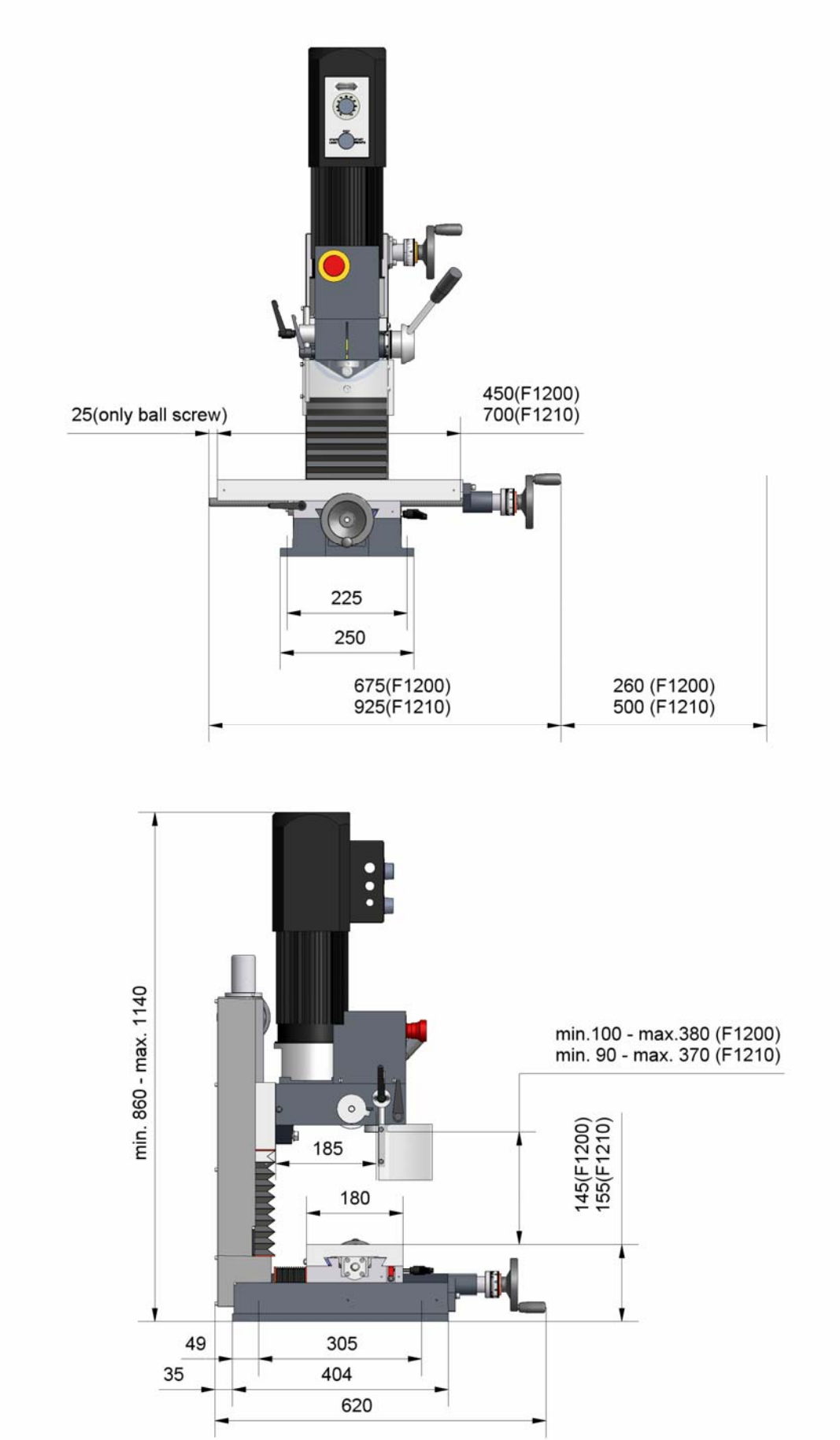

1. Dimensions

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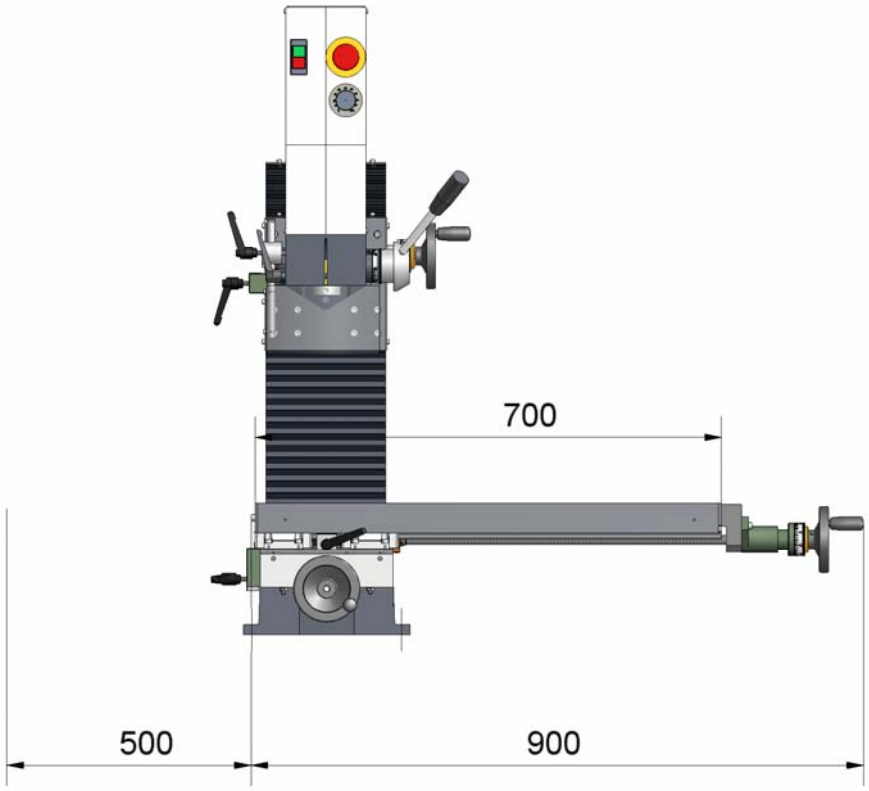
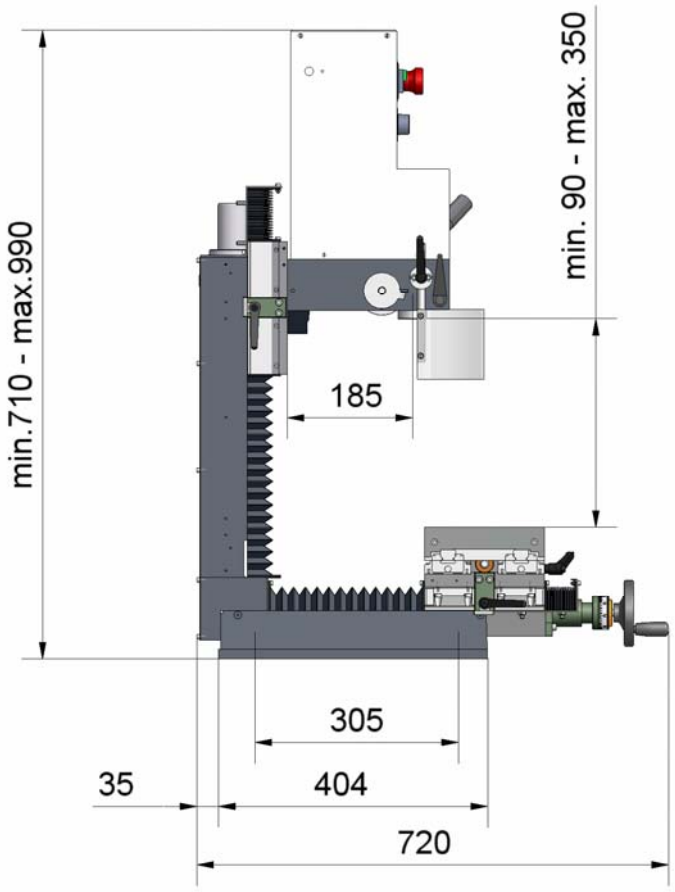
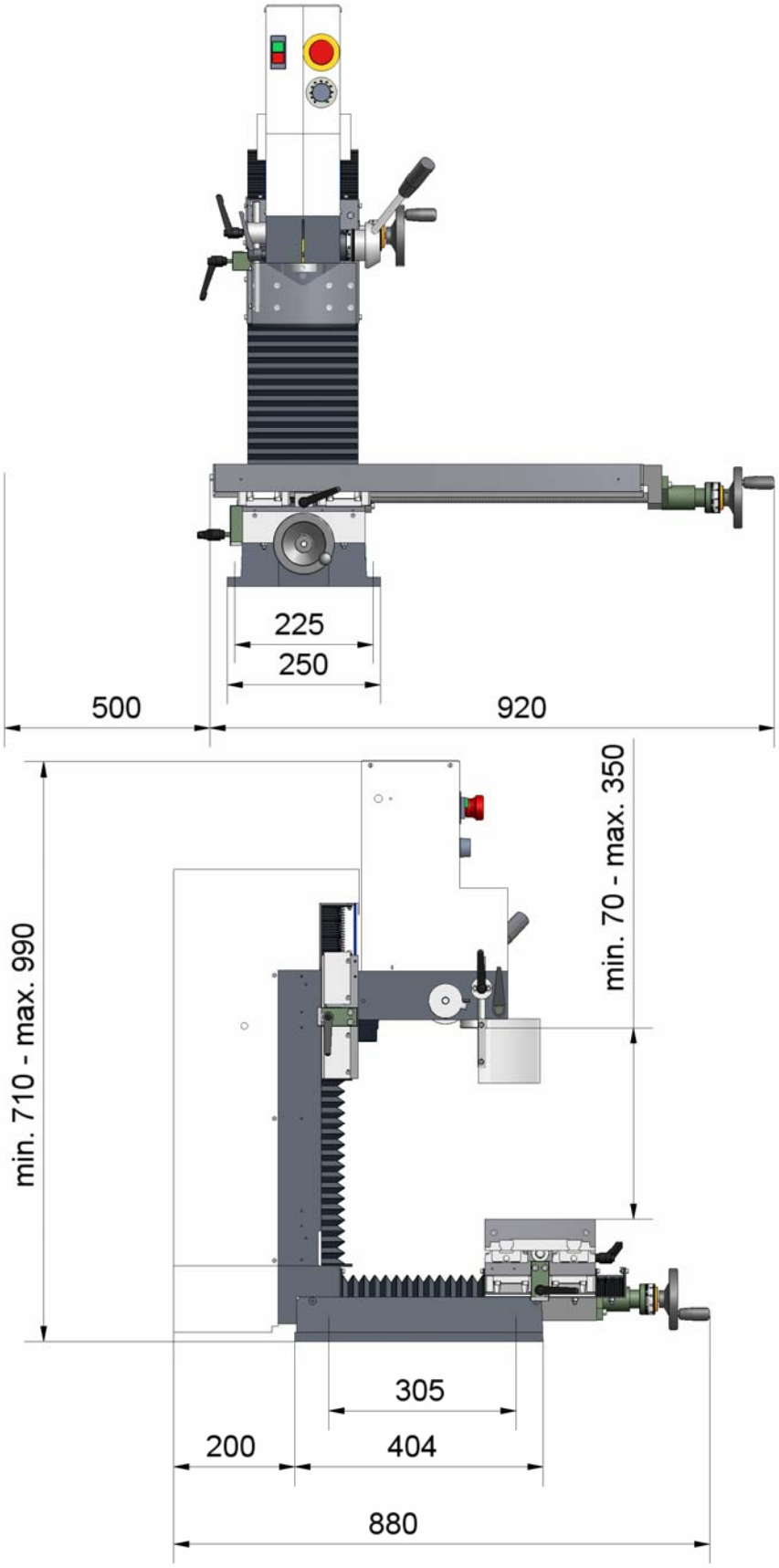




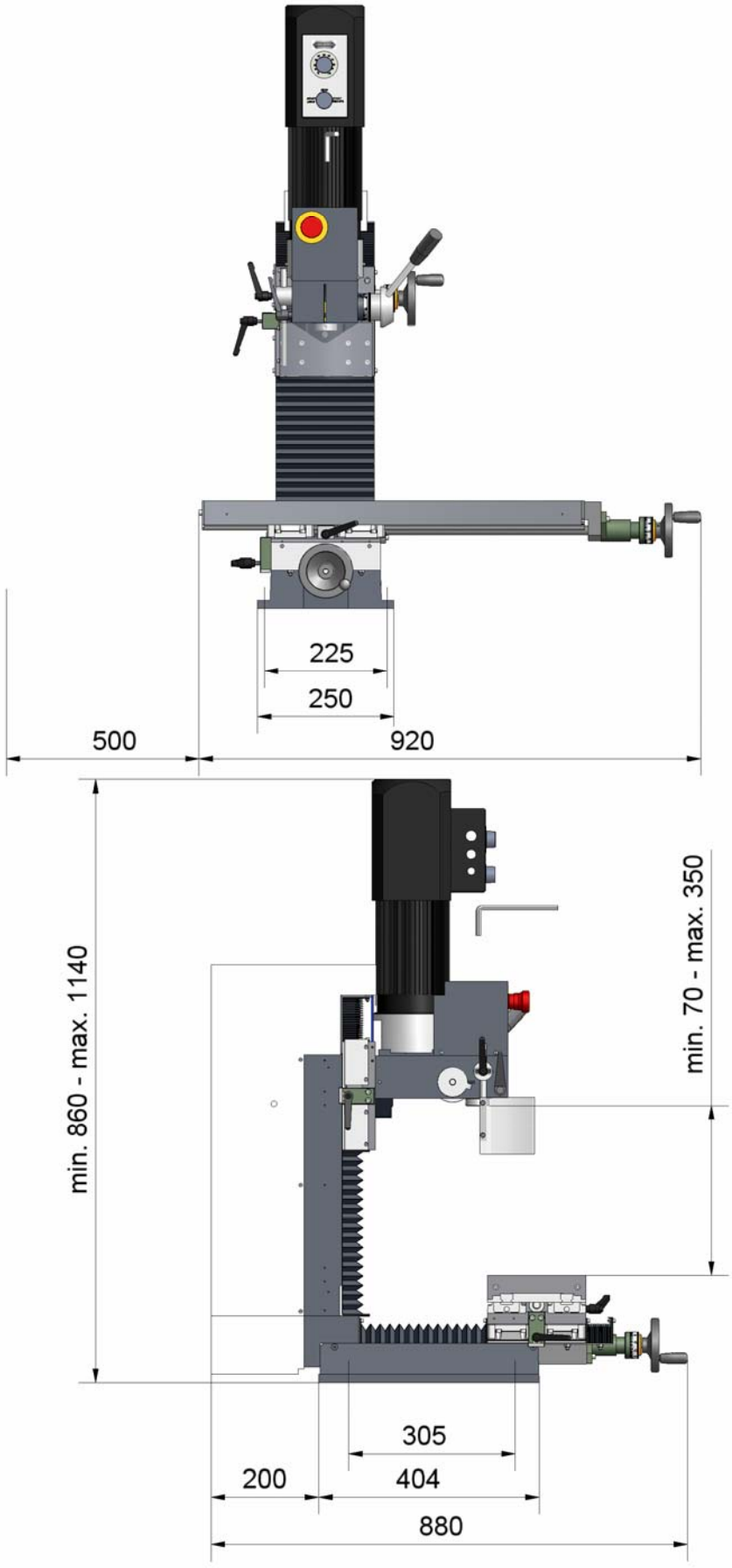
1. Dimensions

1.4 F1410 with ball screw



1. Dimensions

1.5 F1410 high speed with ball screw



2. Delivery and installation

The drilling and milling machines are carefully packed in our factory.

Please check the following upon receipt of delivery:

1. **Whether the packaging has been damaged and/or:**
2. **Whether the drilling and milling machine shows signs of transport damage or if there are reasons for complaints. In this case we request your immediate notification. Claims made at a later date cannot be considered.**

The drilling and milling machine must be installed on an appropriate, level and firm base.

This would be, for example:

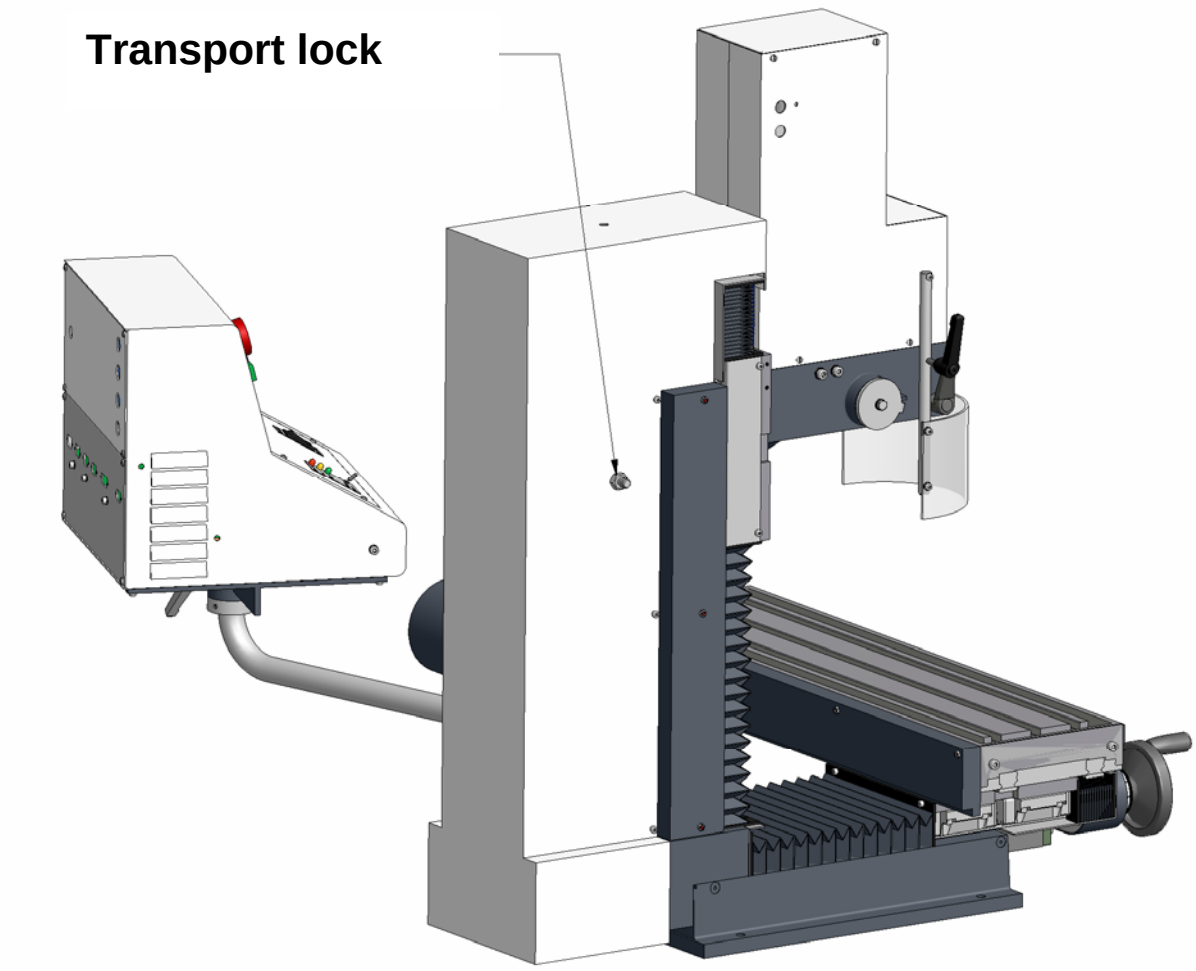
- a base cabinet such as in our accessories' programme
- an own work bench as long as it is strong enough to carry the weight of the machine without warping (see technical data and check with spirit level) and has an even surface
- a steel plate

The drilling and milling machine must be firmly screwed down onto the base. To facilitate this, there are 10 mm holes in the machine base. **Good results and a minimum of vibration during operation can only be guaranteed if the above mentioned requirements for secure mounting have been adhered to.**

The installation of the machine should take place where there is sufficient lighting, electrical cables with earthed sockets and 0-conductors are installed adequately near to the machine so that the mains connection lead is not subject to any tension whatsoever. The mains lead should be such that, by means of a multiple socket, a coolant or lubrication unit can also be connected.

3. Transport lock

F1410 high speed with ball screw



Attention!

The transport lock must be removed prior to the initial start-up of the machine.

Please proceed as follows:

1. Remove the wooden block below the milling spindle by slightly moving the milling head upward via the handwheel of the z axis.
2. Remove the snap ring on both sides of the transport lock. Now the lock can be moved easily. Otherwise, the milling head has to be moved until the wire ropes are tensioned and carry the weight. Now the transport lock can be pulled out.

4. Start-up and maintenance

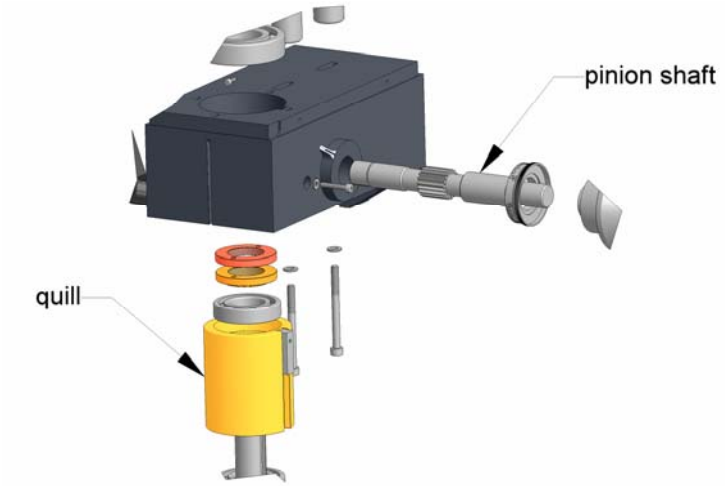
After the machine has been professionally installed and securely mounted, it must be connected to the mains supply.

1. A qualified electrician must connect the supply lead of the drilling and milling machine to the local power supply.
2. Provide sufficient lubrication coolant for running the coolant unit (optional).
3. All functions must be checked.

In order to clamp workpieces a machine vice or clamping screws (suitable for the T grooves) may be used.

Greasing the milling machine
Every 6-8 weeks the **Quill** and the **feed pinion** should be greased (see sketch).

Therefore move the quill up and down while applying some lubricant to the lateral metal-on-metal contact area of the quill and the feed spindle.



It is not necessary to lubricate the **drilling spindle**, as the ball bearings are fully enclosed and had been lubricated during production for the entire service life of the machine.

The **milling machines with linear guides** are maintenance-free and do not need greasing.

Lubrication means:	- reducing the wear and the frictional resistance - extending the lifetime - preventing the metal surfaces from corroding	
We recommend:	for lubrication:	multi-purpose grease grade 2NLGI
	for oiling:	lubrication oil of 100 mm ^{2}/s viscosity

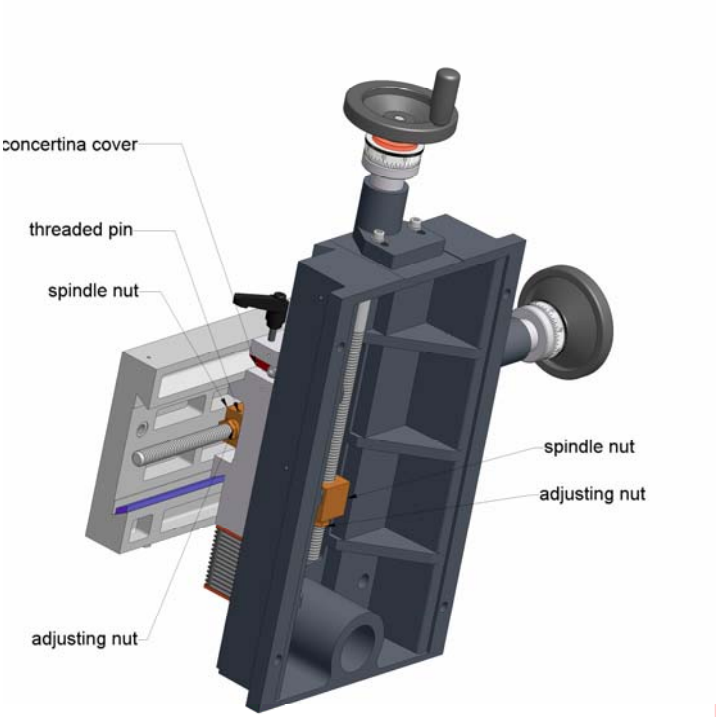
Spindle nuts with trapezoid thread spindle:

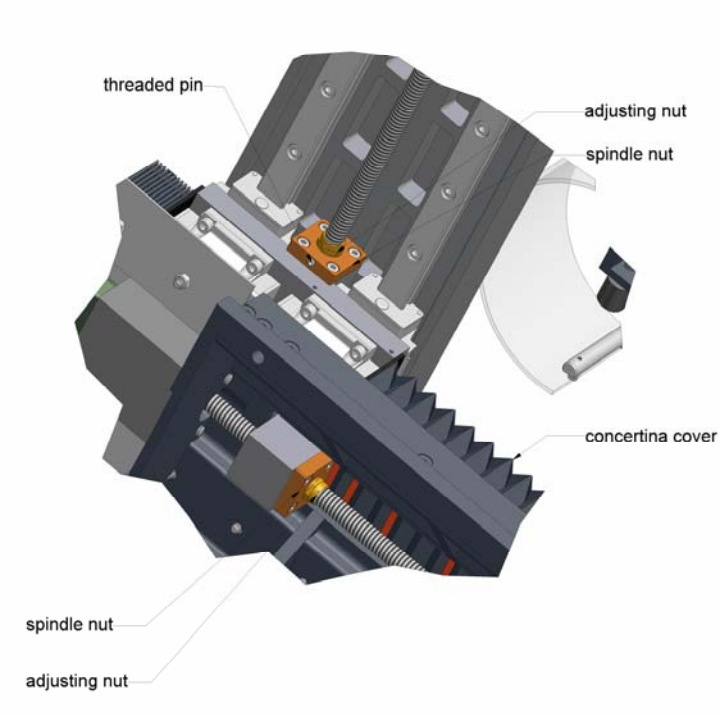
The spindle nuts of the milling machines are adjustable.
Should a spindle nut of one of the three axes have some play, proceed as follows:

4. Start-up and maintenance

X-axis:
To adjust the spindle nut, move the cross table to the centre. After loosening the set screw, the adjusting nut is to be turned a bit in the clockwise direction. Turning the adjusting nut like this achieves a mutual tightening of the two nuts and as a result play-free running of the threaded spindle. After the adjustment, the set screw must be re-tightened firmly.

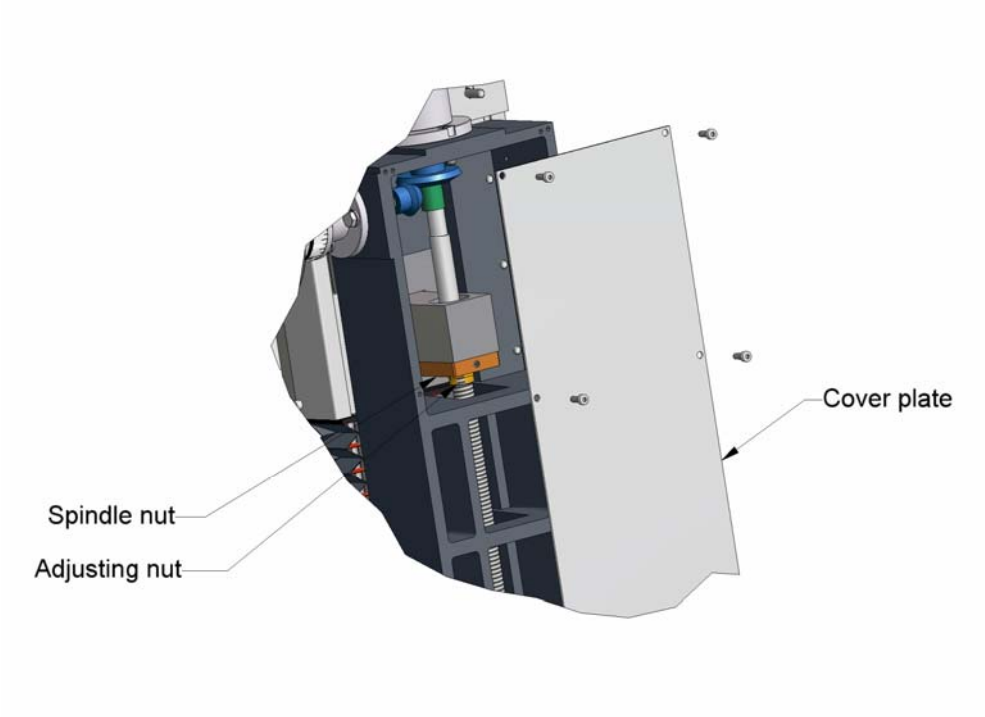
Y-axis:
The readjustment of the Y-axis requires unscrewing the concertina cover of the top slide.
The following procedure is as per instruction for the X-axis.





Z-axis:

To adjust the spindle nut of the Z-axis, you have to unscrew the cover plate.
The further procedure is as for the X-axis.



In the case of spindle nuts with ball screw an adjustment is not necessary and also not possible.

5. Safety devices and recommendations

In order to make working with our drilling and milling machines safe, we have equipped them with the following safety devices and thus they are in accordance with the relevant European safety regulations.

1. **Protective cover**
   The separating safety device attached to the machine housing, prevents reaching in and coming into contact with the tool spindle. This safety device is constructed in such a way that it can be adjusted to the necessary working height (depending on the dimensions of the workpiece and tool).

2. **Main switch with low voltage release**
   In order to disconnect the electrical parts of the drilling and milling machine safely from the mains, we have provided a main switch with low voltage release besides the mains lead with plug. This undervoltage release prevents the drive motor from coming on after a power cut and so excludes the danger of the work spindle moving unexpectedly.

3. **Emergency OFF switch**
   This enables a quick interruption of dangerous movements, in particular of the CNC equipment.

4. **Overload protection**
   This device has been developed to protect the drive motor and it must be noted that after the motor has been turned off (by hand or automatically), because of overloading, a short pause of 1-3 seconds must be observed before turning the machine on again so that the relay of the electronical parts can re-establish the closed circuit condition.

5. **Safety machine cabin**
   During the CNC operation the door of the safety machine cabin must be closed. On the right upper side there is a limit switch that is operated by closing the door. This is the only way to move the feed motors at the axes independently via the controller.

   Only with the door closed it is possible that the feed motors at the axes are moved independently via the CNC-controller. When the door is open, the motors are being switched off the power supply which enables manual operation. The main spindle can be swichted on either when the door is closed or opened.

   Working in manual mode with the door opened.

   When switching from manual operation to CNC mode please proceed as follows:

   1. close the door of the safety machine cabin
   2. turn the flip switch from manual operation to CNC operation
   3. select main spindle rotating direction left or right
   4. set the spindle speed by means of the potentiometer
   5. release the flip switch to move the axes
   6. start the CNC programme

It is forbidden to remove the door limit switch or to put it out of action as this could lead to serious danger to the machine operator and cause severe accidents.

5. Safety devices and recommendations

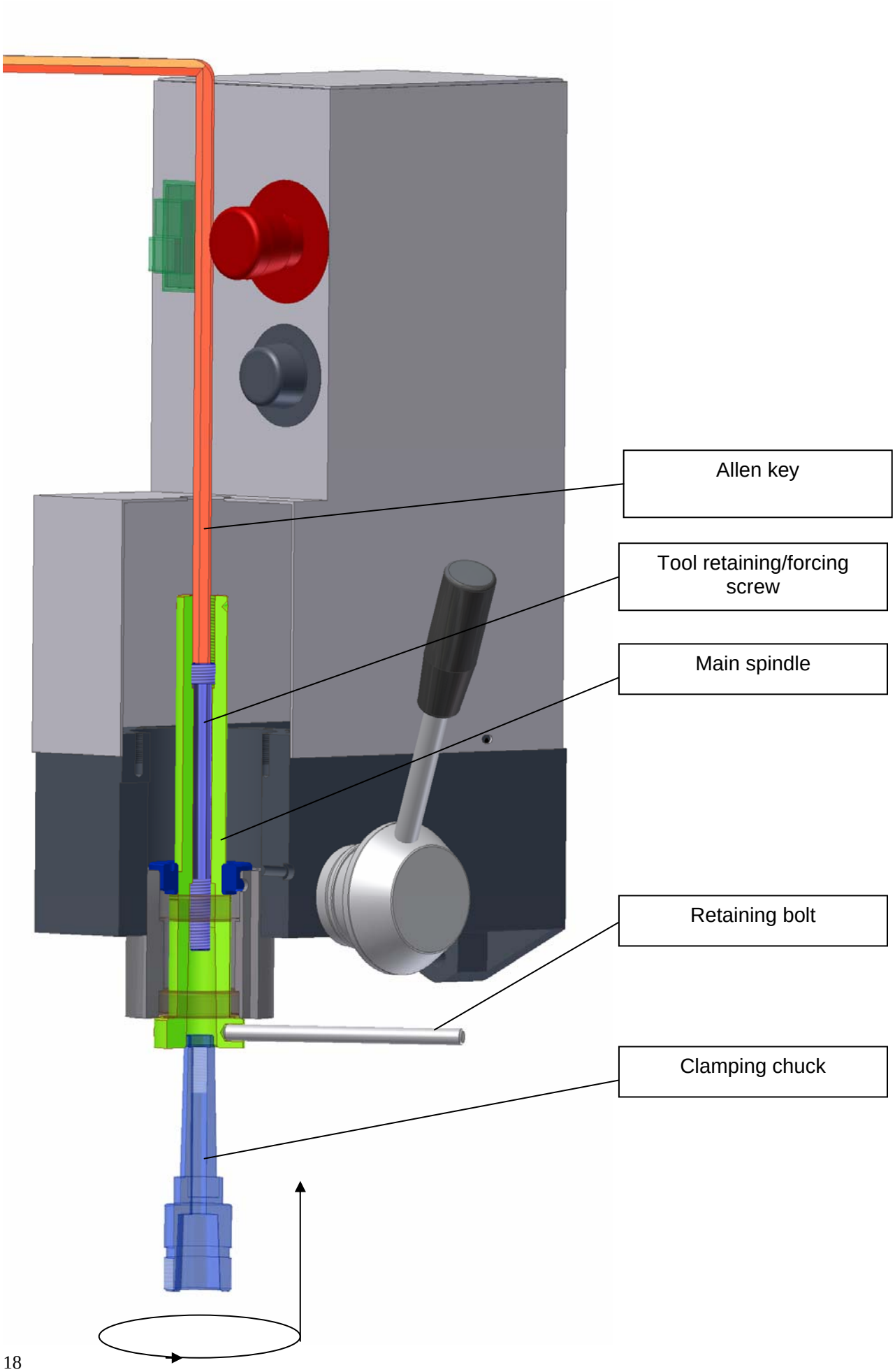
We would like to draw your attention to the following safety recommendations which are a result of a combination of the European standards and our own experience:

1. Workpieces must be secured in such a way that they cannot be propelled out of position by the torque of the drill or mill.
2. Round workpieces such as corrugated pieces, round turning part or similar things must be fixed into position by suitable means such as prisms in conjunction with a machine vice when drilling.
3. Machine drills and mills are sharp-edged tools. In order to protect hands, these tools should only be held by the shaft and **not** by the cutting edge when being transported or changed.

The cutting edges of the tools are sharp and can cause serious injury when touched.

4. Throughout the drilling and milling processes, sharp and often hot swarf is produced which is then thrown off by the momentum of the tool in operation. In order to prevent accidents it is necessary to wear goggles or a face shield.
5. It is furthermore recommended to wear well-fitting clothes, especially on the arms (nothing loose) and in the case of long hair, a hair net should be worn to prevent anything being caught or drawn in by the rotating work spindle or when changing the workpieces.
6. By pulling the mains plug, the drilling and milling machine is disconnected from the electrical current. This should be observed when
   - a drill or mill is changed
   - the machine has to be serviced.
7. In order to avoid wear and tear on the tools and the drive motor, it is recommended that the tools are to be selected with care, worn tools should be exchanged for sharp ones and the feed should be calculated such that the r.p.m. of the work spindle is only slightly reduced. The depth of the feed must be selected with precision so that it is not possible to drill into the support table.
8. We recommend the installation of light which provides a level of at least 500 lux at the point of tool cutting operations.
9. Appropriate means must be used to dispose of drilling and milling swarf.
10. We strongly recommend that the drill chuck key is be fixed to the machine by means of a clamp or similar attachments only. This is in order to avoid the drill chuck key being caught by the tool spindle and being thrown around if it is fixed to the machine with anything flexible like chains or string.
11. When drilling and milling machines are not in use, we recommend installing a safety device to prevent children or non authorized people from switching on the machine.
12. The drilling and milling machine should be set up where no humidity, apart from the lubrication coolant, can affect it.
13. It is necessary to carry out regular checks for damages to parts and/or for the functions, on drilling and milling machines. Please do not hesitate to call us if you require original spare parts or advice!

6. Clamping and ejecting tools



6. Clamping and ejecting tools

This is the core of the WABECO clamping and ejection system**, the tool retaining/forcing screw**. It operates on the principle of the screw having a fine thread located at its head and a coarse thread on the shank. Due to this construction, a special procedure has to be observed when clamping tools with an internal thread.

It is not possible to insert a tool or tool holder with internal threads into the work spindle first and to screw the tool retaining/forcing screw into the internal thread afterwards! The tool or tool holder must be screwed onto the tool retaining/forcing screw.

As you can see on the picture (page 18), for clarification we have cut open the protective cover and the spindle housing so that the tool retaining screw with the Allen key can be seen.

Please proceed as follows:

With the aid of the Allen key, screw the tool retaining/forcing screw into the work spindle right up to the end of its thread. Once the screw blocks, turn it back 2-3 revolutions.

Now the tool is inserted by hand from underneath into the taper of the work spindle and screwed onto the tool retaining/forcing screw. While this is being done, the tool retaining screw is held tight by means of the Allen key.

Once the tool has been clamped hand-tight, the work spindle is held by means of the holding pin and the tool retaining screw can be tightened with the Allen key without any effort.

To eject **tools with an internal thread**, hold the tool spindle tight with the holding pin and loosen the tool retaining screw with the Allen key.
Now the tool can be screwed off the tool retaining/forcing screw by hand and taken out of the work spindle taper from underneath.

Tools with flat tang (without internal threads) can be clamped by first of all screwing the tool retaining screw as far back with the Allen key as is necessary to insert the tool into the work spindle. After doing this, the tool retaining/forcing screw is screwed lightly onto the tool.

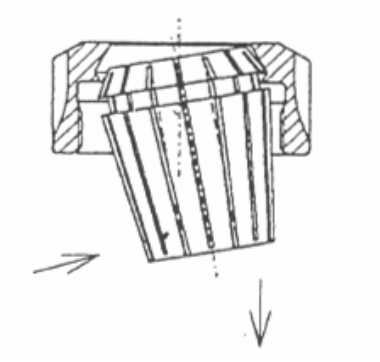
To eject the tool, the holding pin is inserted into the tool spindle and held tight with one hand. By turning the Allen key to the left, the tool is released and can be easily removed from the work spindle.

7. Assembly and disassembly of collets

Disassembly

Take the clamping nut in one hand and press it against the collet as you can see it on the illustration.

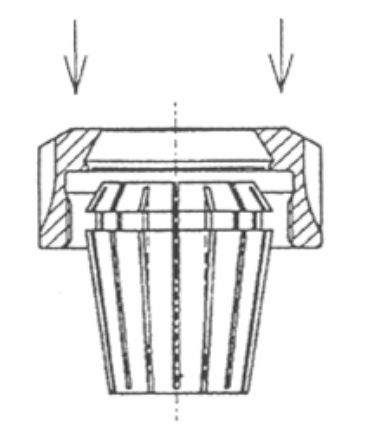
The lateral pressure exerted on the collet causes the clamping nut to leap so that can easily be taken out of the nut.



Assembly

Put the collet on a flat underlay and place the clamping nut on the collet.

Now press the clamping nut down against the collet until it snaps. The collet can move freely in the centrical chamfer. It will not fall out even if you turn it around.



8. Speed regulation

A specific cutting speed is required when milling different materials (e.g. steel, aluminium etc.)
The r.p.m. of the work spindle can be infinitely varied from 140-3000 min^{-1} or 100–7500 min^{-1} on the potentiometer respectively, so that the appropriate speed for the material, the workpiece and the diameter of the cutter can be chosen every time.
Please see the table showing the respective r.p.m. values for aluminium and steel as follows:

8.1 Speed regulation for machining aluminium and steel

ALUMINIUM		STEEL	
tool-Ø	**r.p.m. $^{-1}$**	**tool-Ø**	**r.p.m. $^{-1}$**
2 mm	3000	2 mm	2000
4 mm	2900	4 mm	1400
6 mm	2850	6 mm	1200
8 mm	2750	8 mm	850
10 mm	2700	10 mm	700
12 mm	2650	12 mm	590
14 mm	2600	14 mm	500

8.2 Speed regulation for 1.4 kW motor

%	r.p.m. $^{-1}$
1	140
5	140
10	150
15	160
20	200
25	300
30	400
35	700
40	850
45	1000
50	1200
55	1500
60	1900
65	2500
70	2800
80	3000
90	3000
100	3000

8. Speed regulation

8.3 Speed regulation for 2.0 kW motor (high speed)

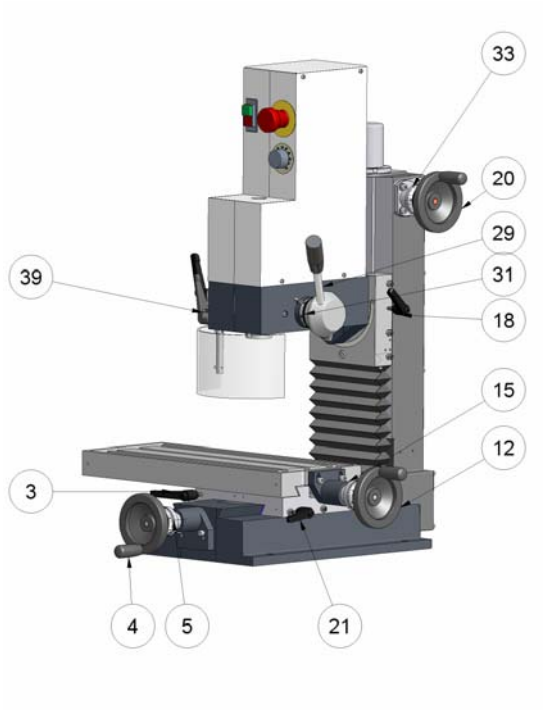
%	r.p.m. $^{-1}$
2	50
3	100
4	200
5	350
10	700
15	1000
20	1400
25	1700
30	2100
35	2500
40	2900
45	3200
50	3600
55	4050
60	4500
65	4800
70	5200
75	5600
80	6050
85	6500
90	6900
95	7200
100	7500

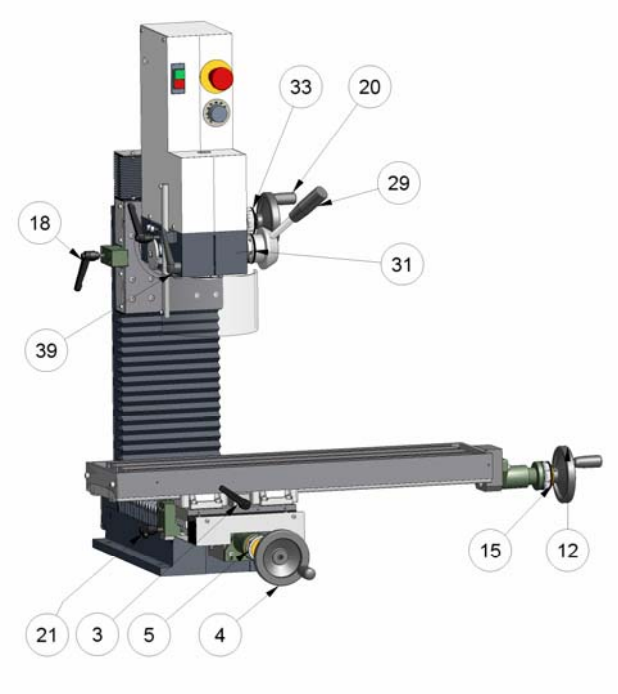
9. Feed motion X,Y and Z-axis

The traverse and longitudinal motion of the cross support (X,Y-axis) is accomplished by turning the handwheels (parts-no. 4 and 12). Both slides can be blocked by means of the clamping levers (parts-no. 21 and 3).

The feed motion – drilling and milling depth (Z-axis) – is accomplished by using the handwheel (part-no. 20). To operate the milling head by means of the handwheel, loosen clamp lever (part-no. 18) and fix it again after operation.

The travel path can be read from the scale rings. One graduation mark corresponds to 0.05 mm. A complete revolution of the handwheel corresponds to a slide path at the
X-axis (scale ring part no. 15) and Y-axis (scale ring part no. 5) of 4 mm, with ball screws 5 mm, at the Z-axis (scale ring part no. 33) of 2 mm. with ball screws of 2.5 mm.





Another possibility of operating the tool spindle is by turning the operating lever (part no. 29). After loosening the clamping lever (part-no. 39) the control lever can be turned. One graduation mark on the collar (part-no. 31) corresponds to 1 mm of travel.

The clamping lever must be well tightened again afterwards. The work spindle has a maximum travel of 55 mm.

We recommend that the feed range (infeed) should not be selected too generously, but that in the case of greater infeed depth this should be accomplished in multiple steps.

10. Recommendations for application and operation

We recommend the following:

- the drill should be inserted and clamped with the chuck key in such a way that the drill is positioned exactly between the three clamping jaws of the toothed ring chuck, the quick action chuck or the drawing-in attachment of the drill
- mills with a shaft should be clamped by means of a precision draw-in attachment with morse taper MT2 and tightening thread M10 and the appropriate precision clamping collet in accordance with DIN (German Industrial Standard)
- mills with a bore hole (all those with a Ø of 16 mm) and a longitudinal groove should be clamped by means of precision shell end mill with mill retaining screw and feather key, MT2x16, draw-in tightening thread M10

It is important to observe the following when drilling:

- the appropriate r.p.m. must be set according to the diameter of the drill
- the contact pressure should be such that the drill can still cut with ease
- when the contact pressure is too high it will result in premature wear on the drills, even the possible snapping of drills or them sticking fast in the bore hole

If a drill sticks fast, switch the motor off immediately, use the emergency OFF switch.

- when processing hard materials, i.e. steel, normal commercial drilling oil must be used
- the spindle must always rotate when the drill is removed from the workpiece
- when processing non-metallic materials, i.e. wood and when having to drill right through, splintering can be prevented by clamping a piece of waste wood under the material to be processed
- when processing veneered or plastic-coated workpieces of wood, always drill from the good side
- when processing thin metal sheeting, a piece of waste wood should always be clamped underneath

It is important to observe the following when milling:

- choose the appropriate cutting speed:
  for materials with normal mechanical strength properties, e.g. steel 18-22m/min
  for materials with higher mechanical strength properties 10-14m/min
  (see also paragraph 9 - r.p.m. adjustment)
- regulate the contact pressure so that the cutting speed remains constant
- when processing hard materials use normal commercial drilling oil

It is important to observe the following when clamping the workpieces:

- use suitable straining screws or machine vices for the T-slots of the milling machine table
- always remove waste material and swarf from the milling machine table of the cross support in order to clamp level and accurately

10. Recommendations for application and operation

10.1 Swivelling of the milling head

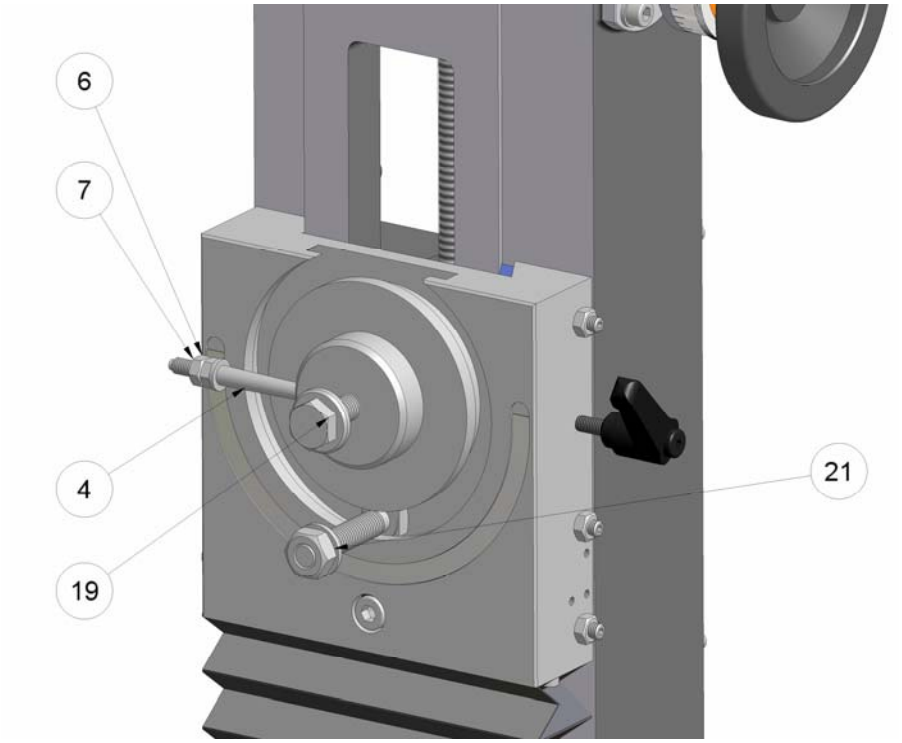
In order to produce bore holes and chamfering at an angle which diverges from the normal vertical position of the milling head, the milling head can be swivelled up to 90° either to the right or to the left.

If an adjustment is intended please proceed as follows:

After loosening (turn to the left) the lock nut (part-no. 7) turn the hexagon nut as far to the right against the housing of the tool spindle until the index pin (part-no. 4) can be pulled out by hand.

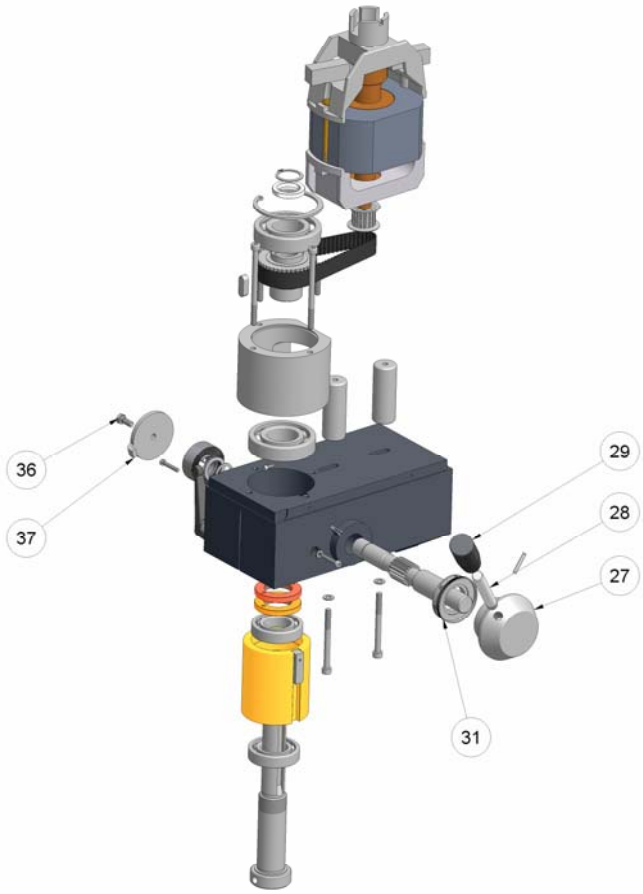
Loosen both the high nut (part-no. 19) and the hexagon nut (part-no. 21) on the vertical slide by then turning to the left.
Now the milling head can be swivelled to the desired degree to the left or to the right. In order to fix the milling head in this position, tighten both the high nut and the hexagon nut again.

In order to bring the milling head back to its normal position, loosen the high nut and the hexagon nut on the vertical slide and bring the vertical slide back to its upright position.
After turning back the hexagon nut on the index pin, the latter can be pushed into the opening in the work spindle housing by hand. Now, both the hexagon nut and the lock nut of the index pin as well as the hexagon nut and the high nut on the vertical slide can all be tightened.



10. Recommendations for application and operation

10.2 Drill stroke – depth stop



It is also possible to set the feed motion of the milling spindle to a specified measure.
Therefore, the desired depth can be adjusted by means of the operating lever (part no. 27,28,29) (depth can be read from the scale ring part no. 31), and the depth stop part no. 37 is to be turned to the correct position, so that it hits the milling head. Then tighten the hexagon bolt (part no. 36).

11. Coolant unit

The coolant unit consists of:

1. Tray with lubrication coolant sump which collects the lubrication coolant mixture fort he feed pump.
   Content: Coolant unit 13 litres
   Safety machine cabin 42 litres

2. Feed pump with the following electrical data:
   - nominal voltage 230 V
   - frequency 50/60 Hz
   - nominal current input 0,4A
   - nominal output 0,07 kW
   - ON-OFF switch and mains lead with a length of 2 m complete with earthed plug

3. Adjustable, flexible pressure tubing with stop valve and nozzle: for transporting the lubrication coolant to the processing point.

When using lubrication coolants, especially water based emulsions, a number of health and safety measures must be observed:

1. use concentrated products free of nitrates
2. use concentrates without secondary amins
3. use products with the lowest possible allergy potential

When mixing a refill of lubrication coolant, please observe the following:

- clean/rinse the circulation system (tray/filter)
- determine the concentration necessary to meet the technical demands

(concentrate: water 1:5 – 1:30)

- check the water has a low level of nitrates (< 50 mg NO 3-, test strip)

A cleaning plan should determine at what intervals the system should be cleaned of swarf and other waste.

A service plan should determine the following:

- when to check the concentration in use (daily/weekly)
- when to check the pH values (weekly)
- when to check/assess the bacteria count (monthly)
- when to check the nitrate content (weekly)

(The information in brackets can be varied according to the production circumstances)
In order to reduce splashing, we recommend the attachment of a splash guard and/or reducing amount sprayed from the nozzle.

Since steps to protect the skin must be taken, it is advisable to wear gloves and aprons. The skin should be cleaned with acidic syndets without abrasive ingredients and rich cream should be applied to regenerate the skin.

Please also adhere to the enclosed information on the general operating instructions.

12. Declaration of noise levels in accordance with DIN EN 24871 (German Industrial Standard)

Noise levels while running idle

Acoustic capacity level	**78 dB (A)**
Sound pressure level on operator's ear	**62 dB (A)**

The stated values reflect emission levels and not necessarily working levels. Although there is a correlation between the level of emission and the level of stress, this cannot be used reliably in order to determine whether additional safety measures are necessary or not.
Other factors which influence the actual stress level or employees are the characteristics of the working area, other sources of noise, i.e. the number of machines and other processes going on nearby etc. Apart from that, the permitted stress levels may vary from country to country.
This information enables the user of the machine to assess the dangers and risks more accurately.
However, in order to state a reference value of noise levels which could manifest itself to the ears of the operator during processing, the following measurement conditions are given:

Shell end mill 10 mm, cutting depth 3 mm
Spindle r.p.m. 2240 1/min, feed 0,09 mm/revolution, AlCuMgPb-cuboid workpiece

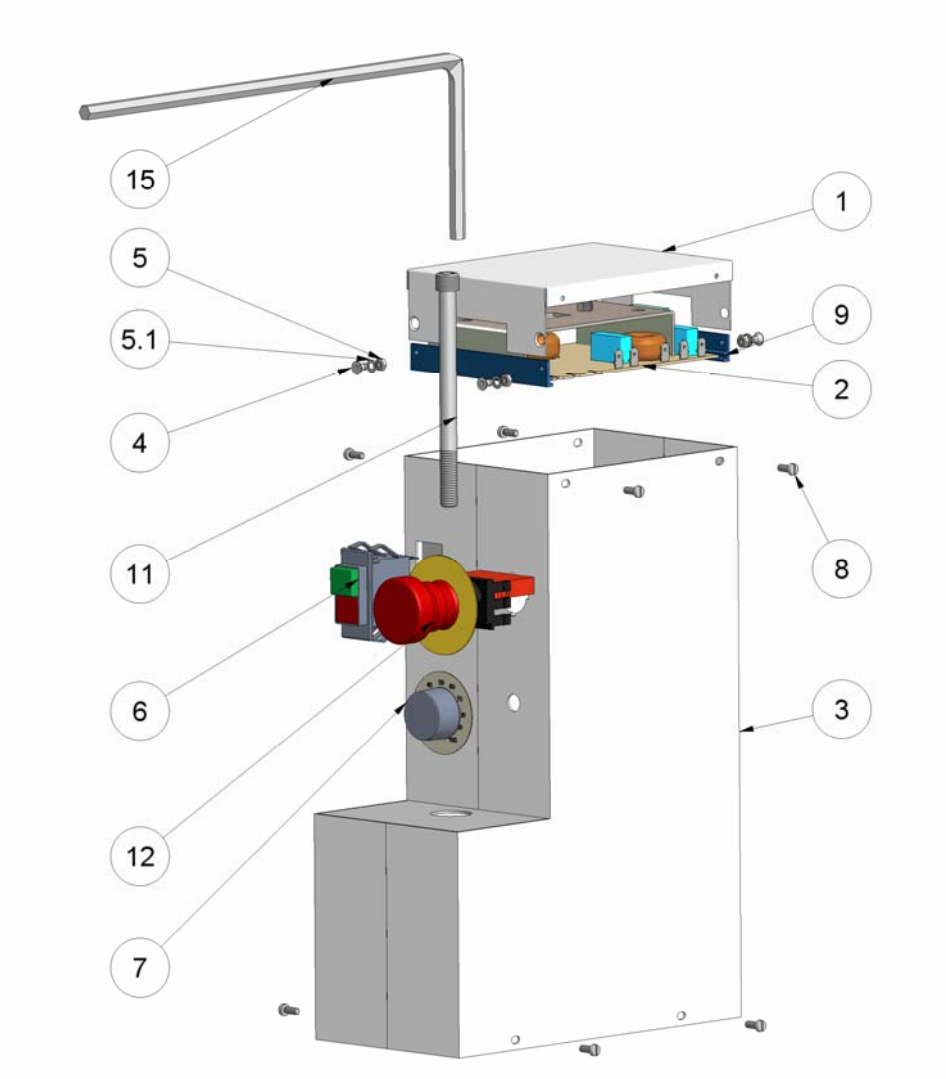
The adjusted sound pressure level is 91 dB (A).

13. Drawing and list of parts

13.1 Electronics – protective cover for milling machines with 1.4 kW motor

F1200 – F1210 - F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11200401	Cap
2	1	11800005	Circuit board
3	1	11200403	Cover
4	4	11700001	Countersunk screw
5	4	11700002	Hexagon nut
5.1	4	11700120	Locking washer
6	1	11800001	ON/OFF switch
7	1	11800004	Potentiometer
8	8	11700003	Tapping screw
9	2	11200405	board rest
11	1	11200411	Tool draw-in bolt with thread M10 **for MT2**
11	1	112004111	Tool draw-in bolt with thread M12 **for MT3/SK30**
12	1	11800008	Emergency OFF switch (german)
15	1	11200415	Allen key 8 mm **for MT2**
15	1	112004151	Allen key 10 mm **for MT3/SK30**

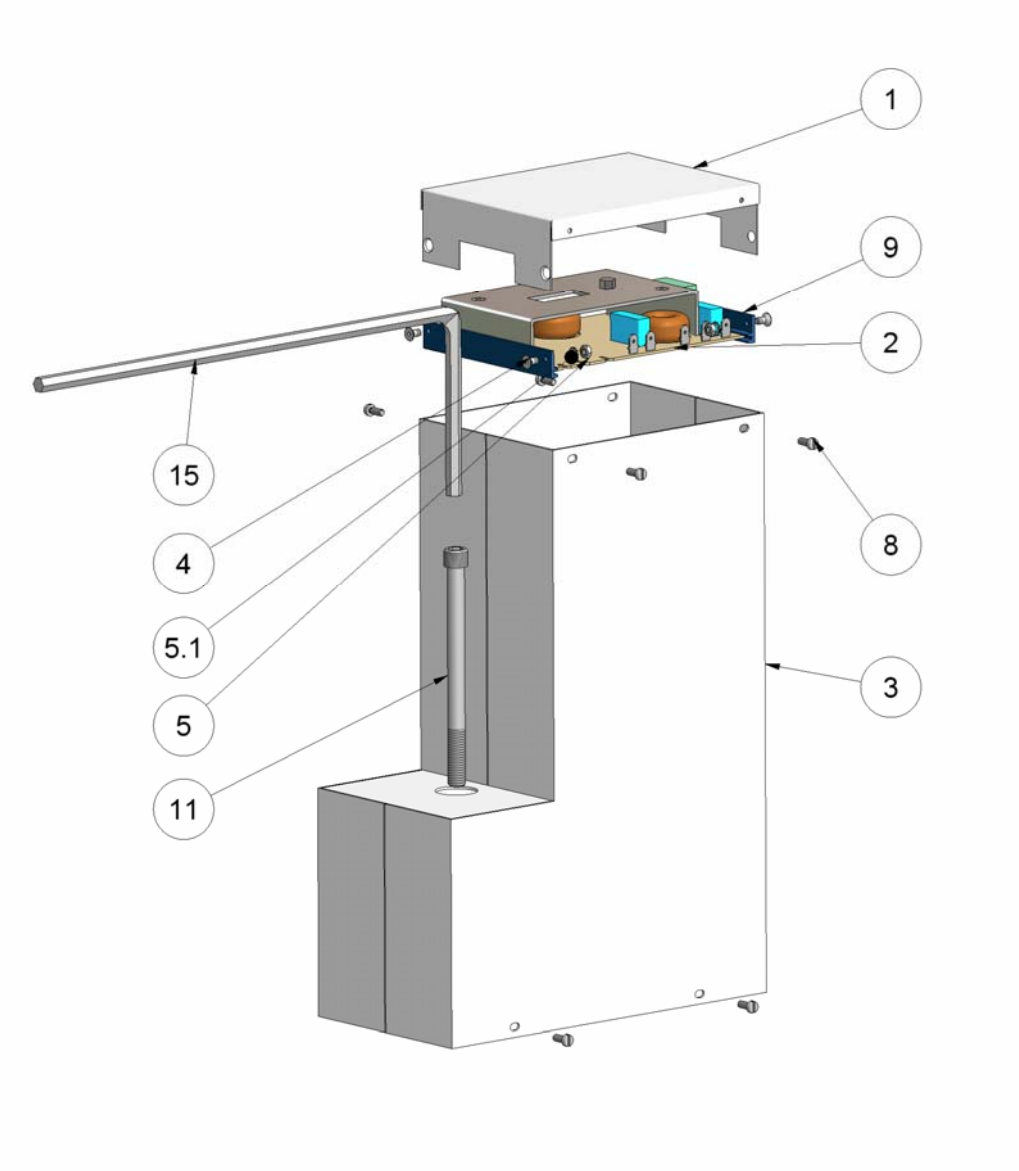


13. Drawing and list of parts

13.2 Electronics – protective cover for CNC milling machines with 1.4 kW motor

CC-F1200 – CC-F1210 – CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11200401	Cap
2	1	11800005	Circuit board
3	1	112004031	Cover
4	4	11700001	Countersunk screw
5	4	11700002	Hexagon nut
5.1	4	11700120	Locking washer
8	8	11700003	Tapping screw
9	2	11200405	Board rest
11	1	11200411	Tool draw-in bolt with thread M10 **for MT2**
11	1	112004111	Tool draw-in bolt with thread M12 **for MT3/SK30**
15	1	11200415	Allen key 8 mm **for MT2**
15	1	112004151	Allen key 10 mm **for MT3/SK30**



13. Drawing and list of parts

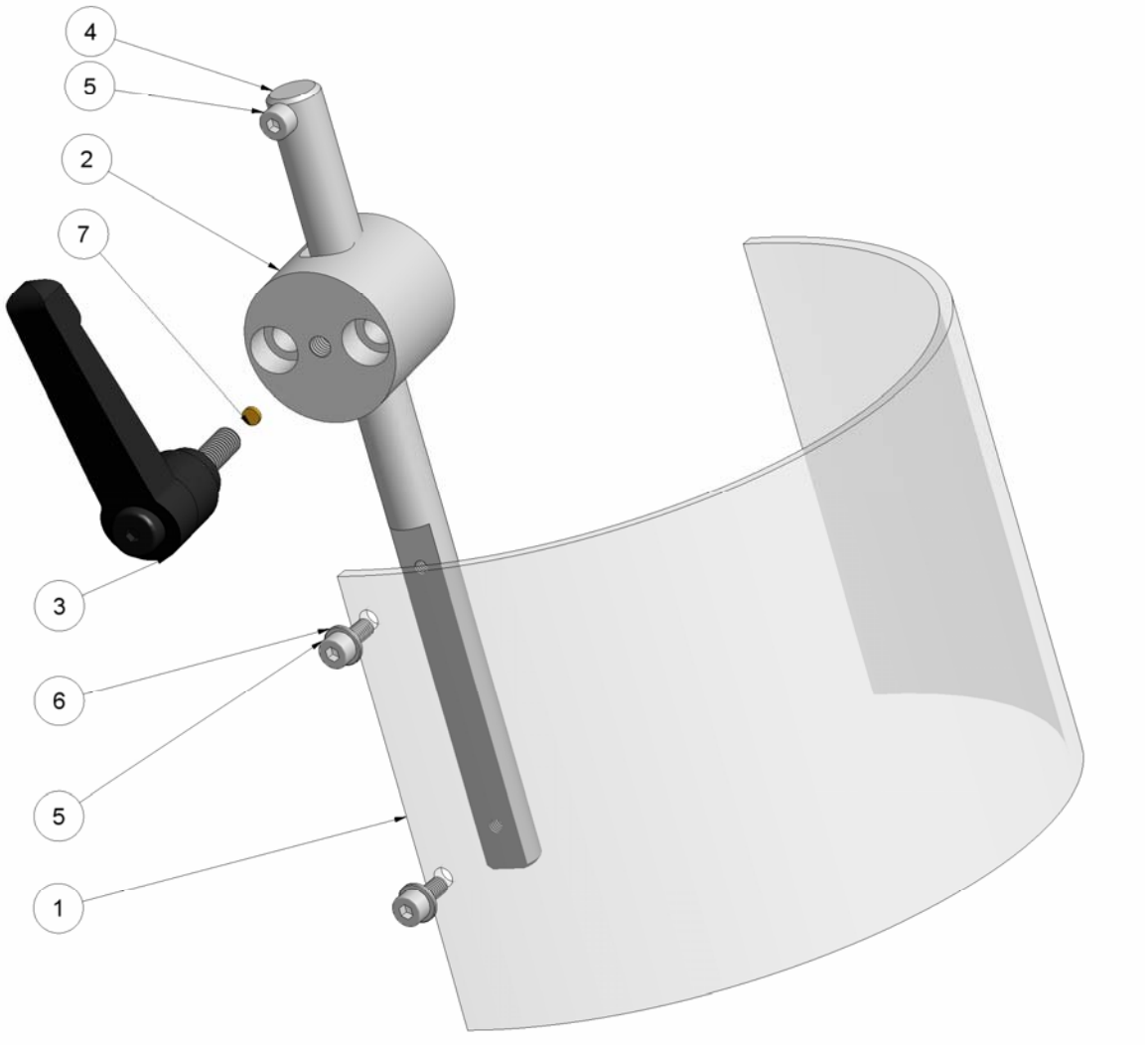
13.3 Protective cover for all milling machines

F1200 - F1200 high speed - CC-F1200 - CC-F1200 high speed

F1210 - F1210 high speed - CC-F1210 - CC-F1210 high speed

F1410 LF - F1410 LF high speed - CC-F1410 LF - CC-F1410 LF high speed

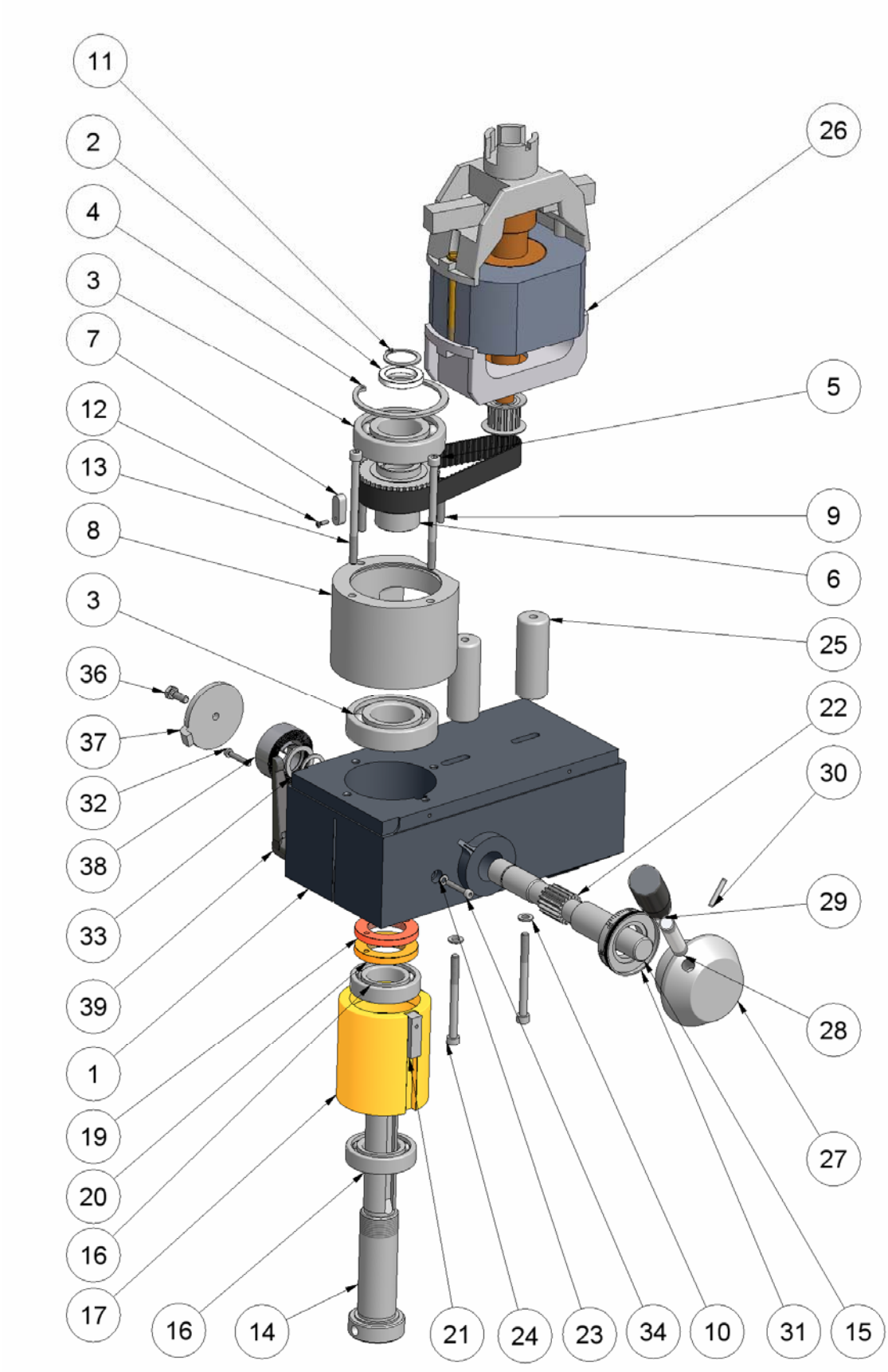
Part-No.	Pieces	Order-No.	Designation
1	1	11270101	Protective cover
2	1	11270102	Clamping fixture
2.1	1	11840004	Clamping lever
3	1	11270103	Guide rod
3.1	3	11700026	Screws
3.2	2	11700038	Washer
7	1	51007250-0001	Brass die



13. Drawing and list of parts

13.4 Milling head for milling machines with 1.4 kW motor

F1200 – F1210 - F1410 LF – CC-F1200 – CC-F1210 - CC-F1410 LF



13. Drawing and list of parts

13.4 Milling head for milling machines with 1.4 kW motor

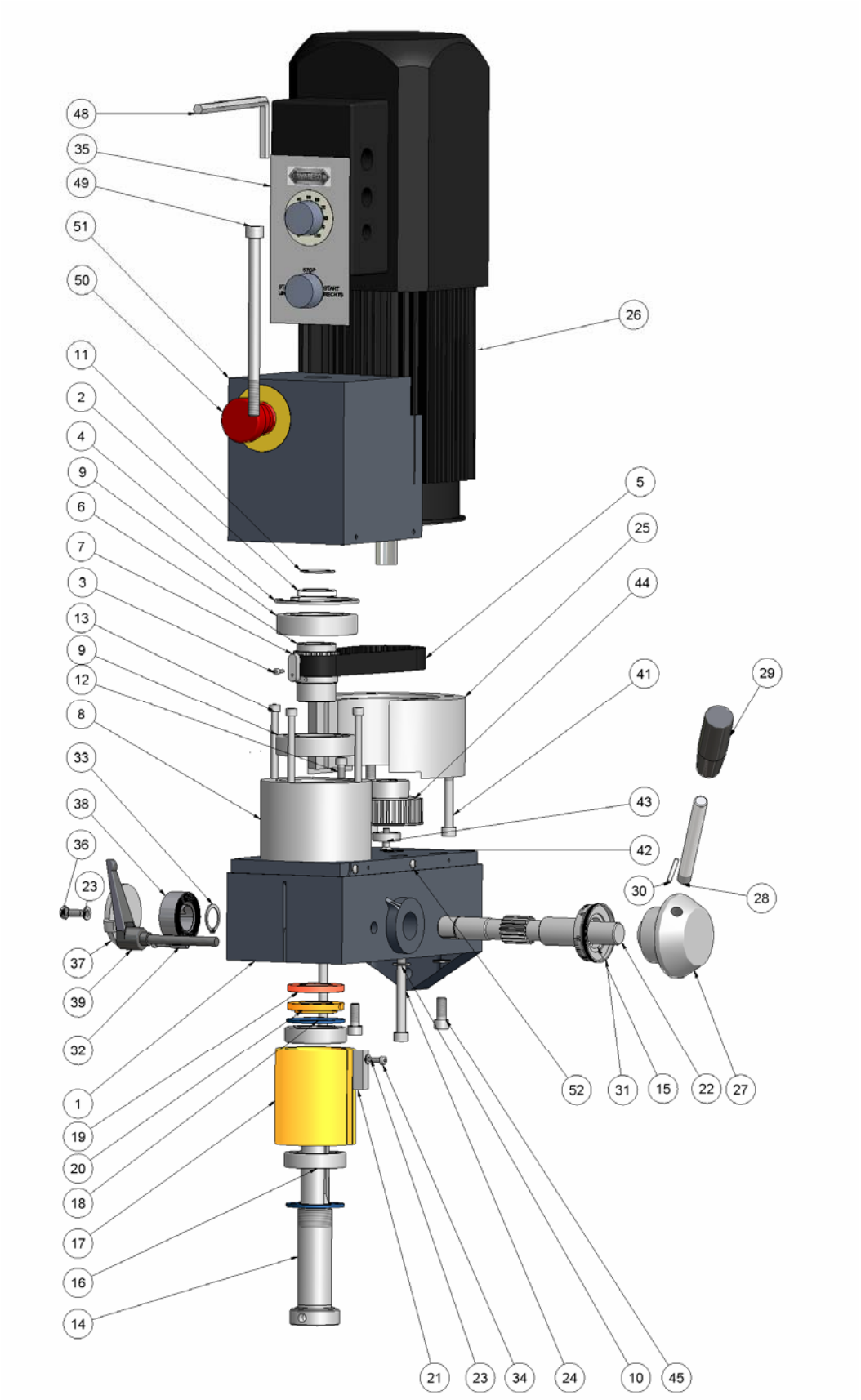
F1200 – F1210 - F1410 LF – CC-F1200 – CC-F1210 - CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11200101	Housing
2	1	11200102	Plastic ring
3	2	11810001	Ball bearing
4	1	11700005	Circlip
5	1	11820001	Drive belt
6	1	11200106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	1	11700046	Hexagon socket srew
10	2	11830001	Limpet washer
11	1	11700027	Circlip
12	1	11700011	Screw
13	3	11700123	Hexagon socket screws
14	1	11200114	Tool spindle **MT2**
14	1	112001141	Tool spindle **MT3**
14	1	112001142	Tool spindle **SK30**
15	1	11200115	Feather wire
16	2	11810002	Ball bearing
17	1	11200117	Quill
19	1	11200119	Nut thin
20	1	11200120	Nut thick
21	1	11200121	Feather key
22	1	11200122	Pinion shaft
23	1	11700018	Washer
24	2	11700010	Hexagon socket srew
25	2	11200125	Spacer sleeve
26	1	11200126	Motor with pinion Z12
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral clamp pin
31	1	11200131	Scale ring
32	1	11700004	Cylinder head screw
33	1	11700012	Circlip
34	1	11700121	Hexagon socket screw
36	1	11700092	Hexagon srew
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever

13. Drawing and list of parts

13.5 Milling head for milling machines high speed with 2.0 kW motor

F1200 high speed – F1210 high speed - F1410 LF high speed



13. Drawing and list of parts

13.5 Milling head for milling machines high speed with 2.0 kW motor

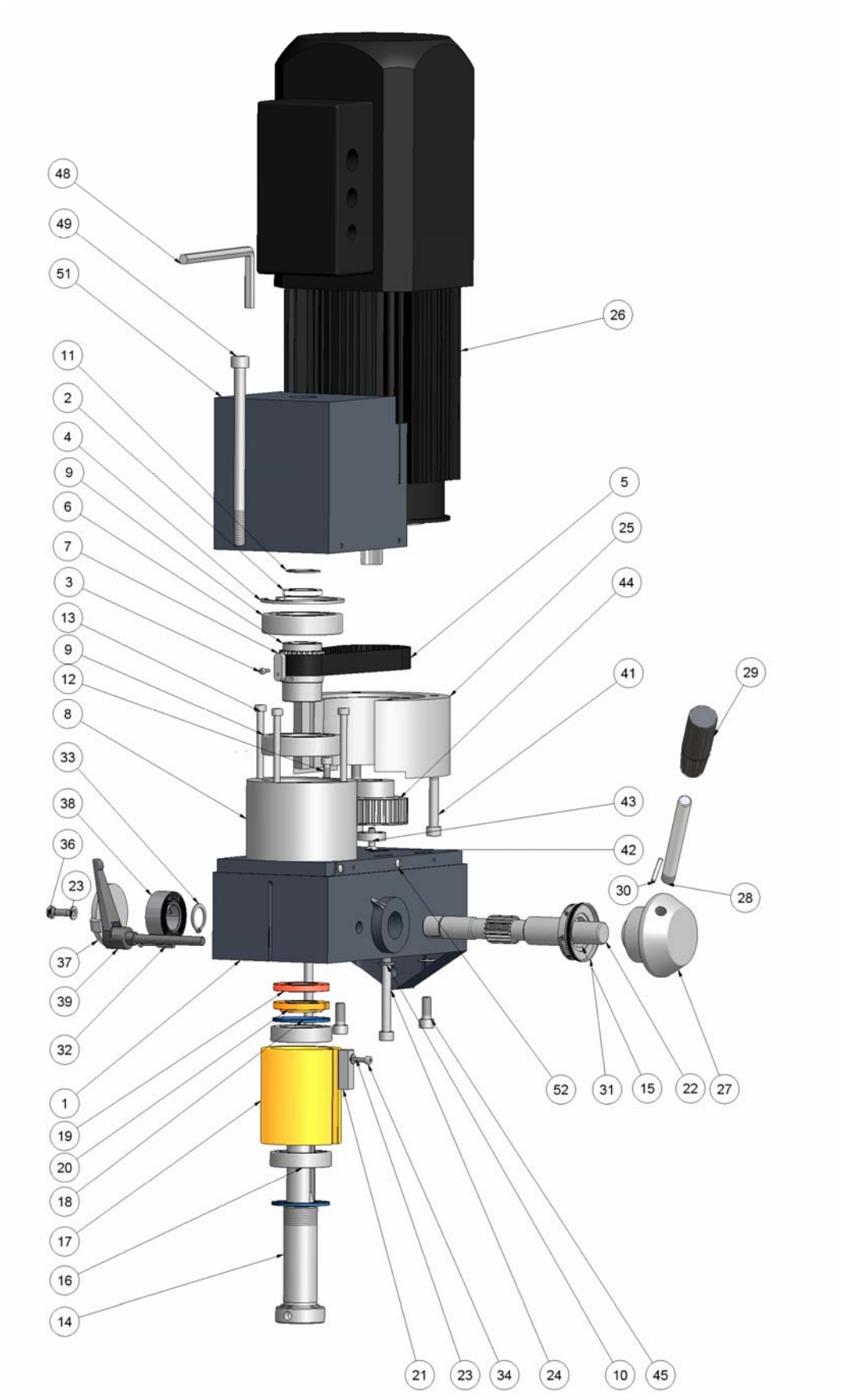
F1200 high speed – F1210 high speed - F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11202101	Housing
2	1	11200102	Plastic ring
3	1	11700116	Hexagon socket screw
4	1	11700005	Circlip
5	1	11820002	Drive belt *F1200 high speed - F1210 high speed*
	1	11820010	Drive belt *F1410LF high speed*
6	1	11202106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	2	11810001	Ball bearing
10	6	11700060	Limpet washer
11	1	11700025	Circlip
12	1	11700046	Hexagon socket screw
13	3	11700123	Hexagon socket screws
14	1	11200114	Tool spindle **MT2**
14.1	1	112001141	Tool spindle **MT3**
14.2	1	112001142	Tool spindle **SK30**
15	1	11200115	Spring wire
16	2	11810021	Spiral bearing
17	1	11200117	Quill
18	2	11810022	Nilos ring (special seal washer)
19	1	11200119	Nut thin
20	1	11200120	Nut thick
21	1	11200121	Feather key
22	1	11200122	Pinion shaft
23	1	11700018	Washer
24	2	11700123	Hexagon socket screw
25	1	11202125	Flange
26	1	11239	Motor high speed
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral pin
31	1	11200131	Scale ring
32	1	11700124	Cylinder head screw
33	1	11700012	Circlip
34	1	11700121	Hexagon socket screw
35	1	11800029	Operating cover
36	1	11700092	Hexagon screw
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever
41	2	11700036	Hexagon socket screw
42	1	11700051	Flat-headed screw
43	1	11202143	Thrust washer
44	1	11202144	Motor belt pulley
45	2	11700021	Hexagon socket screw
48	1	11200416	Allen key 8 mm **MT2**
48.1	1	112004161	Allen key 10 mm **MT3/SK30**
49	1	11200411	Tool draw-in bolt with thread M10 **MT2**
49.1	1	112004111	Tool draw-in bolt with thread M12 **MT3/SK30**
50	1	11800008	Emergency OFF switch
51	1	11202151	Protective cover

13. Drawing and list of parts

13.6 Milling head for CNC milling machines high speed with 2.0 kW motor

CC-F1200 high speed – CC-F1210 high speed - CC-F1410 LF high speed



13. Drawing and list of parts

13.6 Milling head for CNC milling machines high speed with 2.0 kW Motor

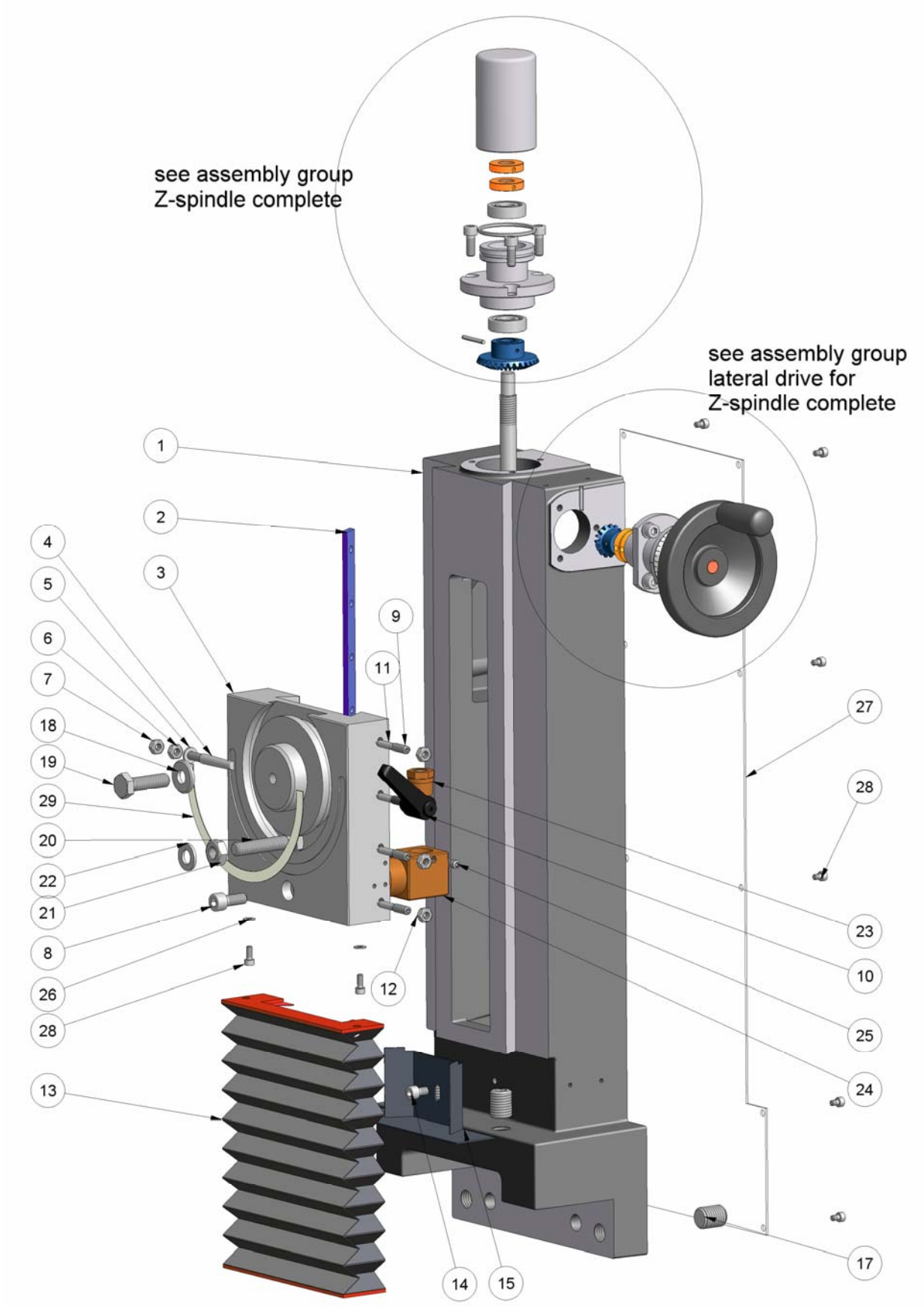
CC-F1200 high speed – CC-F1210 high speed - CC-F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11202101	Housing
2	1	11200102	Plastic ring
3	1	11700116	Hexagon socket screw
4	1	11700005	Circlip
5	1	11820002	Drive belt *F1200 high speed - F1210 high speed*
	1	11820010	Drive belt *F1410 LF high speed*
6	1	11202106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	2	11810001	Ball bearing
10	6	11700060	Limpet washer
11	1	11700025	Circlip
12	1	11700046	Hexagon socket screw
13	3	11700123	Hexagon socket screws
14	1	11200114	Tool spindle **MT2**
14.1	1	112001141	Tool spindle **MT3**
14.2	1	112001142	Tool spindle **SK30**
15	1	11200115	Spring wire
16	2	11810021	Spiral bearing
17	1	11200117	Quill
18	2	11810022	Nilos ring (special seal washer)
19	1	11200119	Nut thin
20	1	11200120	Nut thick
21	1	11200121	Feather key
22	1	11200122	Pinion shaft
23	1	11700018	Washer
24	2	11700123	Hexagon socket screw
25	1	11202125	Flange
26	1	11239	Motor high speed
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral pin
31	1	11200131	Scale ring
32	1	11700124	Cylinder head screw
33	1	11700012	Circlip
34	1	11700121	Hexagon socket screw
36	1	11700092	Hexagon screw
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever
41	2	11700036	Hexagon socket screw
42	1	11700051	Flat-headed screw
43	1	11202143	Thrust washer
44	1	11202144	Motor belt pulley
45	2	11700021	Hexagon socket screw
48	1	11200416	Allen key 8 mm ***MT2***
48.1	1	112004161	Allen key 10 mm ***MT3/SK30***
49	1	11200411	Tool draw-in bolt with thread M10 ***MT2***
49.1	1	112004111	Tool draw-in bolt with thread M12 ***MT3/SK30***
51	1	11202151	Protective cover

13. Drawing and list of parts

13.7 Z-column with vertical slide for milling machines with trapezoid thread spindle

F1200 – F1200 high speed – F1210 – F1210 high speed



13. Drawing and list of parts

13.7 Z-column with vertical slide for milling machines with trapezoid thread spindle

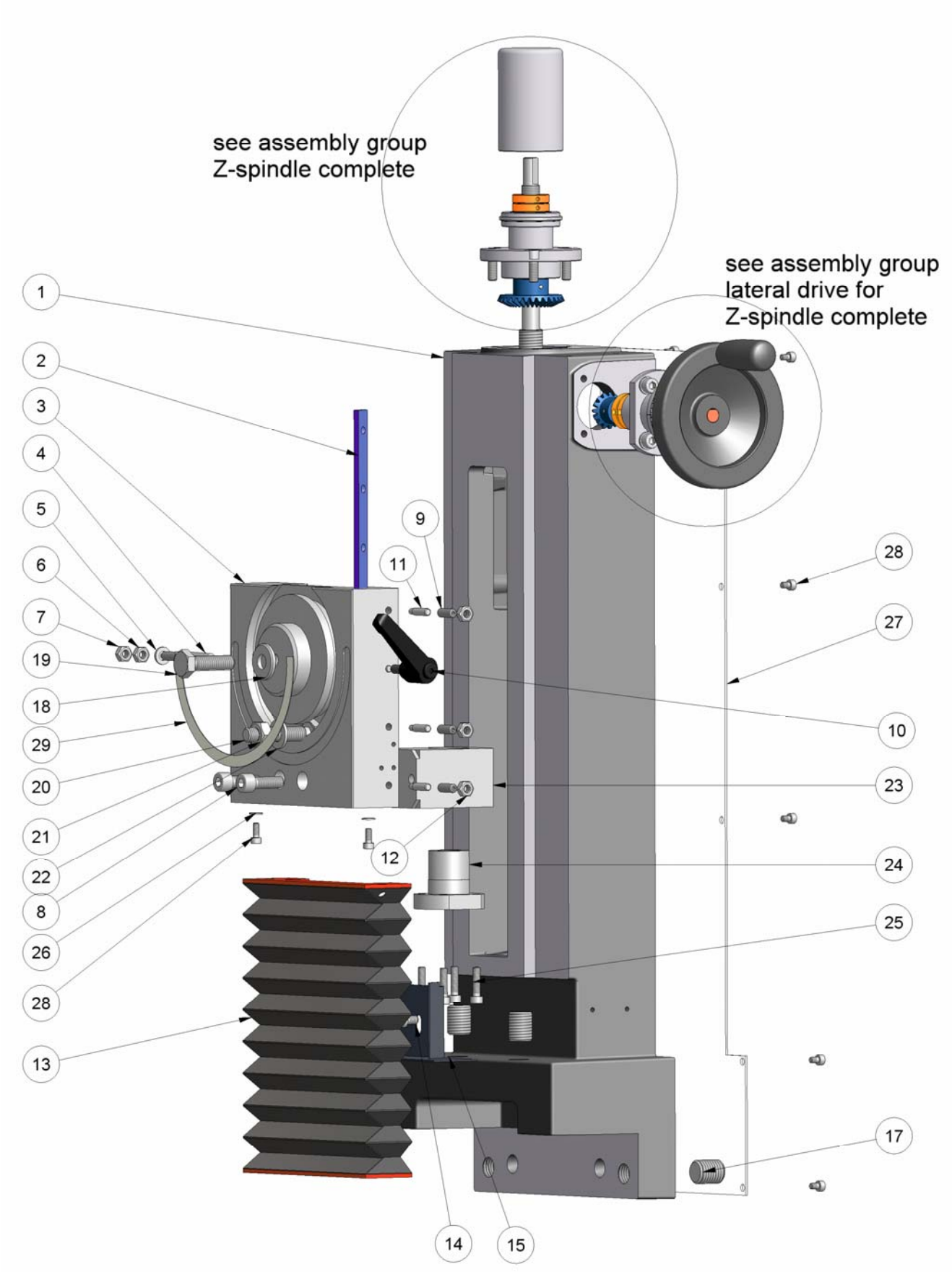
F1200 – F1200 high speed – F1210 – F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Column
2	1	11200302	Adjusting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Washer
6	1	11700019	Hexagon nut
7	1	11700020	Lock nut
8	1	11700021	Hexagon socket screw
9	3	11700123	Threaded pin
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagon nut
13	1	11860001	Concertina cover
14	1	11700022	Screw
15	1	11200315	Concertina cover guide
17	4	11700124	Threaded pin
18	1	11200329	Washer
19	1	11700125	Screw
20	1	11700028	Stud bolt
21	1	11700030	Hexagon nut
22	1	11700029	Washer
23	1	112003261	Counter nut
24	1	11200326	Nut
25	1	11700009	Headless pin
26	2	11700038	Washer
27	1	11200320	Cover plate
28	12	11700026	Screw
29	1	11870001	Alu scale

13. Drawing and list of parts

13.8 Z-column with vertical slide for milling machines with ball screw

F1200 – F1200 high speed – F1210 – F1210 high speed



13. Drawing and list of parts

13.8 Z-column with vertical slide for milling machines with ball screw

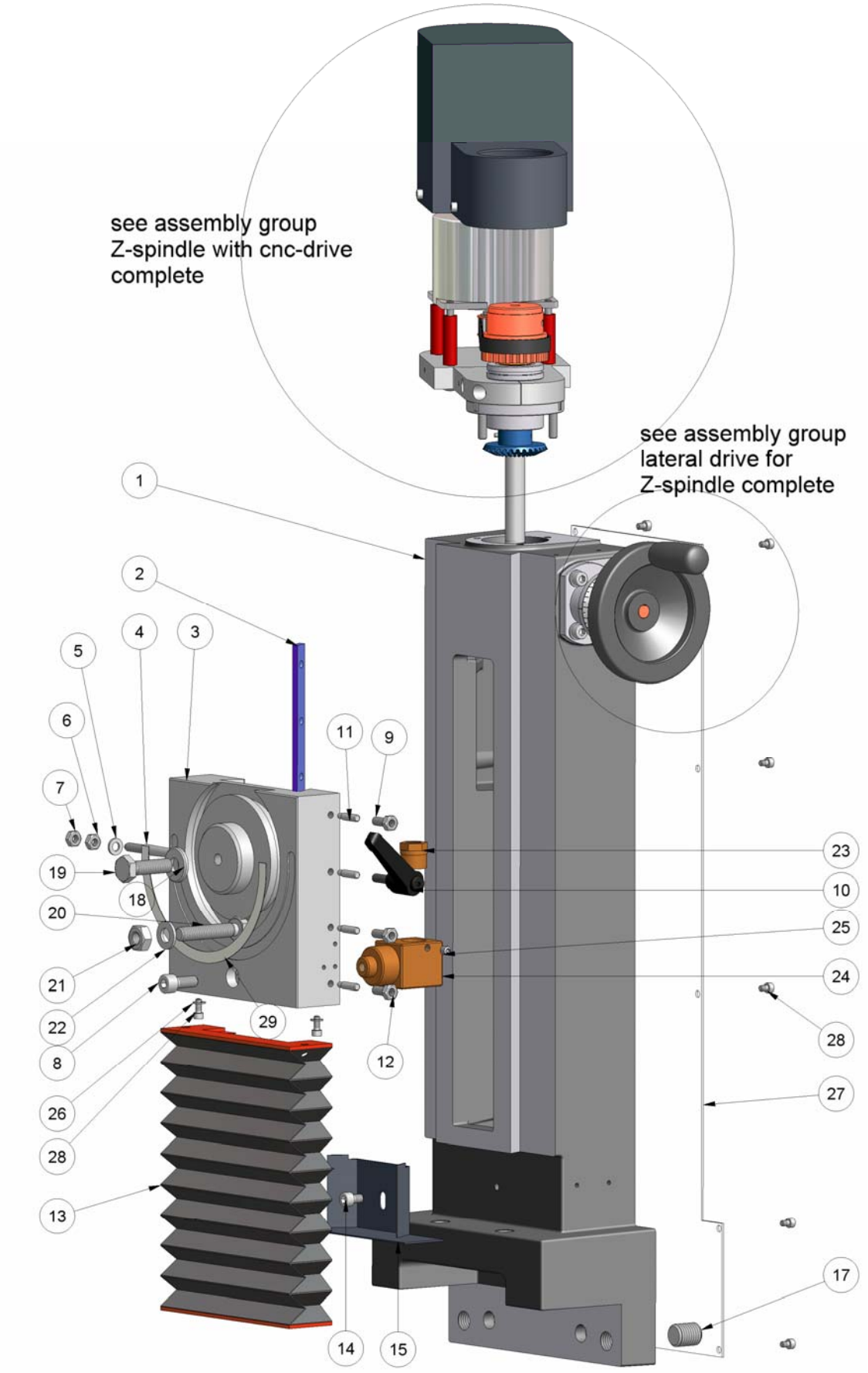
F1200 – F1200 high speed – F1210 – F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Column
2	1	11200302	Adjusting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Washer
6	1	11700019	Hexagon nut
7	1	11700020	Lock nut
8	2	11700021	Hexagon socket screw
9	3	11700123	Headless pin
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagon nut
13	1	11860001	Concertina cover
14	1	11700022	Screw
15	1	11200315	Concertina cover guide
17	4	11700124	Headless pin
18	1	11200329	Washer
19	1	11700125	Screw
20	1	11700028	Stud bolt
21	1	11700030	Hexagon nut
22	1	11700029	Washer
23	1	11245326	Nut holder
24	1		Spindle nut (contained in ball screw order no.11245327)
25	4	11700039	Screw
26	2	11700038	Washer
27	1	11200320	Cover plate
28	12	11700026	Screw
29	1	11870001	Alu scale

13. Drawing and list of parts

13.9 Z-column with vertical slide for CNC milling machines trapezoid thread spindle

CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed



13. Drawing and list of parts

13.9 Z-column with vertical slide for CNC milling machines trapezoid thread spindle

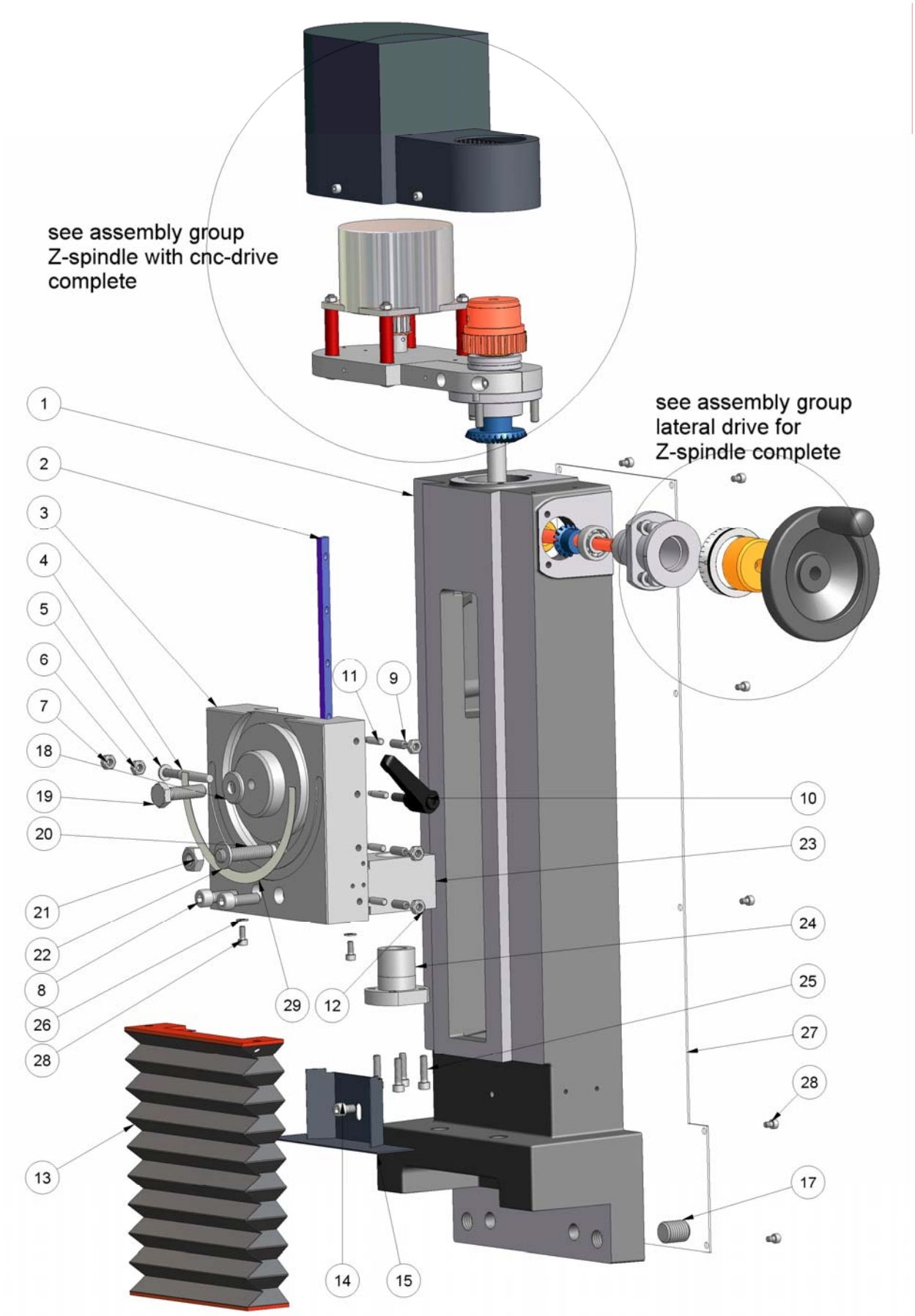
CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Column
2	1	11200302	Adjusting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Washer
6	1	11700019	Hexagon nut
7	1	11700020	Lock nut
8	1	11700021	Hexagon socket screw
9	3	11700123	Headless pin
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagon nut
13	1	11860001	Concertina cover
14	1	11700022	Screw
15	1	11200315	Concertina cover guide
17	4	11700124	Headless pin
18	1	11200329	Washer
19	1	11700125	Screw
20	1	11700028	Stud bolt
21	1	11700030	Hexagon nut
22	1	11700029	Washer
23	1	112003261	Counter nut
24	1	11200326	Nut
25	1	11700009	Headless pin
26	2	11700038	Limpet washer
27	1	11200320	Cover plate
28	12	11700026	Screw
29	1	11870001	Alu scale

13. Drawing and list of parts

13.10 Z-column with vertical slide for CNC milling machines with ball screw

CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed



13. Drawing and list of parts

13.10 Z-column with vertical slide for CNC milling machines with ball screw

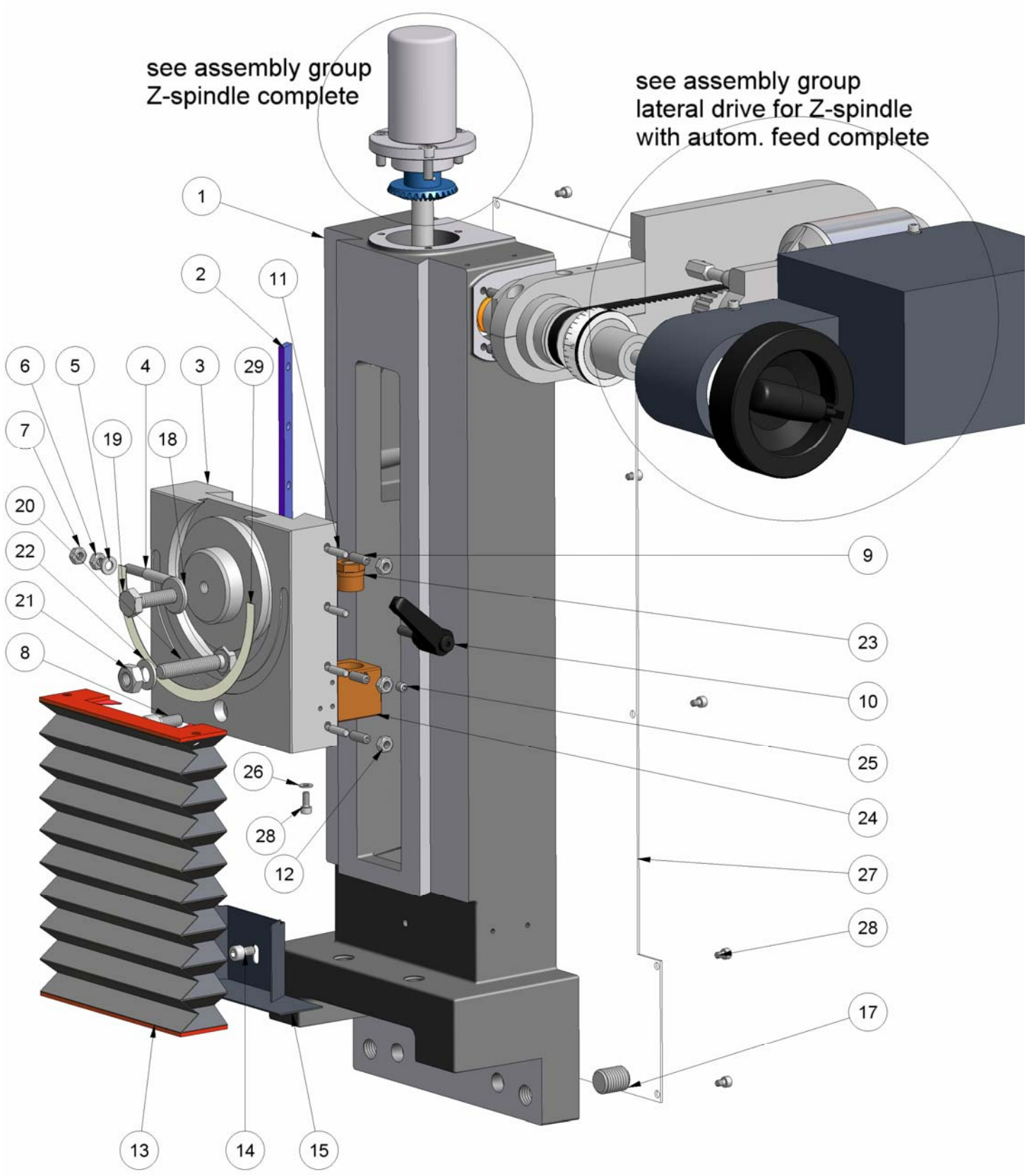
CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Column
2	1	11200302	Adjusting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Washer
6	1	11700019	Hexagon nut
7	1	11700020	Lock nut
8	2	11700021	Hexagon socket screw
9	3	11700123	Headless pin
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagon nut
13	1	11860001	Concertina cover
14	1	11700022	Screw
15	1	11200315	Concertina cover guide
17	4	11700124	Headless pin
18	1	11200329	Washer
19	1	11700125	Screw
20	1	11700028	Stud bolt
21	1	11700030	Hexagon nut
22	1	11700029	Limpet washer
23	1	11245326	Nut holder
24	1		Spindle nut (contained in ball screw order no.11245327)
25	4	11700039	Screw
26	2	11700038	Limpet washer
27	1	11200320	Cover plate
28	12	11700026	Screw
29	1	11870001	Alu scale

13. Drawing and list of parts

13.11 Z-column with vertical slide for Milling machines with automatic feed

F1200 – F1200 high speed – F1210 – F1210 high speed



13. Drawing and list of parts

13.11 Z-column with vertical slide for Milling machines with automatic feed

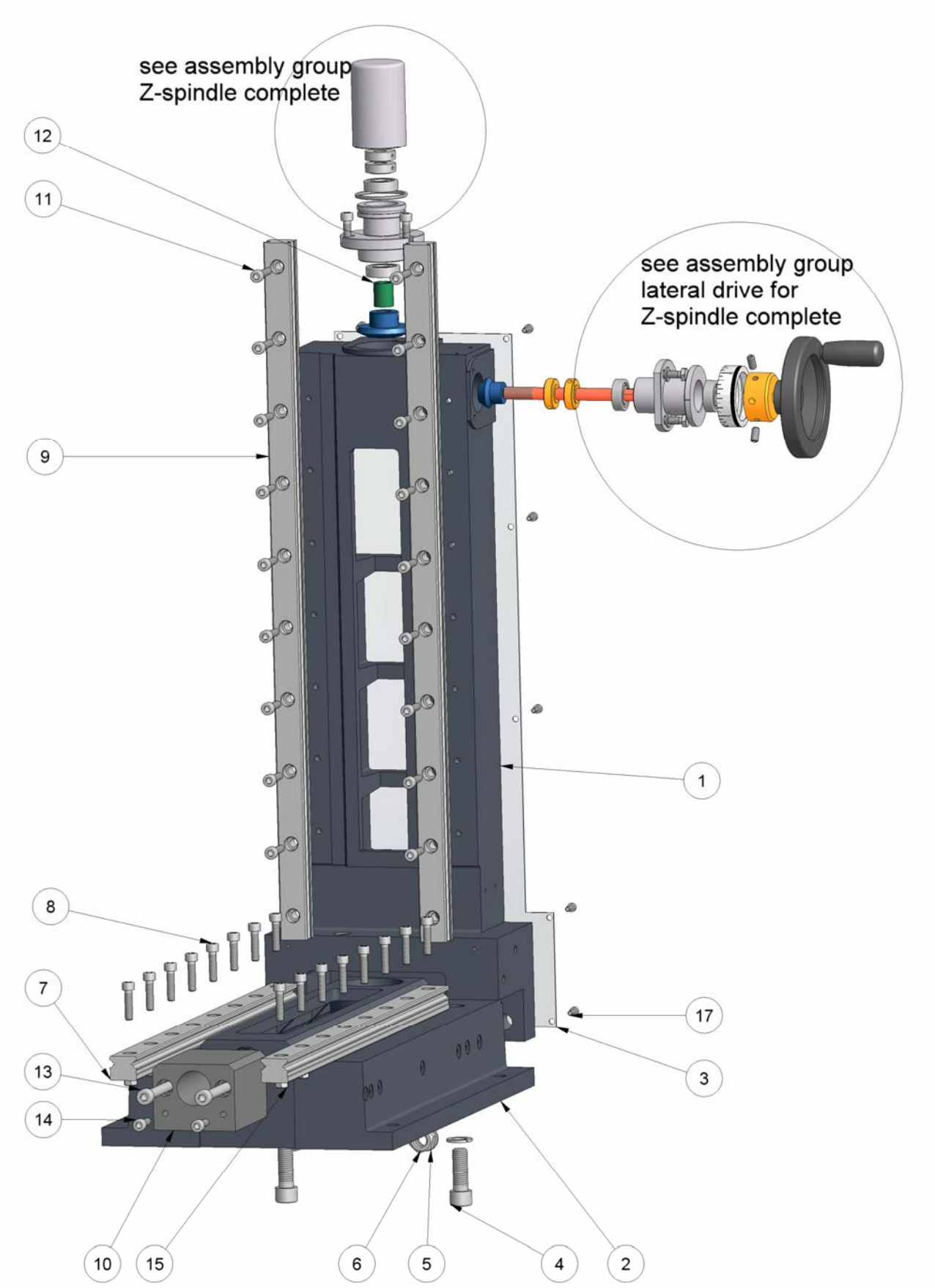
F1200 – F1200 high speed – F1210 – F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Column
2	1	11200302	Adjusting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Limpet washer
6	1	11700019	Hexagon nut
7	1	11700020	Lock nut
8	1	11700021	Hexagon socket screw
9	3	11700123	Threaded pin
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagon nut
13	1	11860001	Concertina cover
14	1	11700022	Screw
15	1	11200315	Concertina cover guide
17	4	11700124	Threaded pin
18	1	11200329	Washer
19	1	11700125	Screw
20	1	11700028	Stud bolt
21	1	11700030	Hexagon nut
22	1	11700029	Washer
23	1	112003261	Counter nut
24	1	11200326	Nut
25	1	11700009	Threaded pin
26	2	11700038	Limpet washer
27	1	11200320	Cover plate
28	12	11700026	Screw
29	1	11870001	Alu scale

13. Drawing and list of parts

13.12 Z-column for milling machines with linear guides with trapezoid thread spindle

F1410 LF



13. Drawing and list of parts

13.12 Z-Column for milling machines with linear guides with trapezoid thread spindle

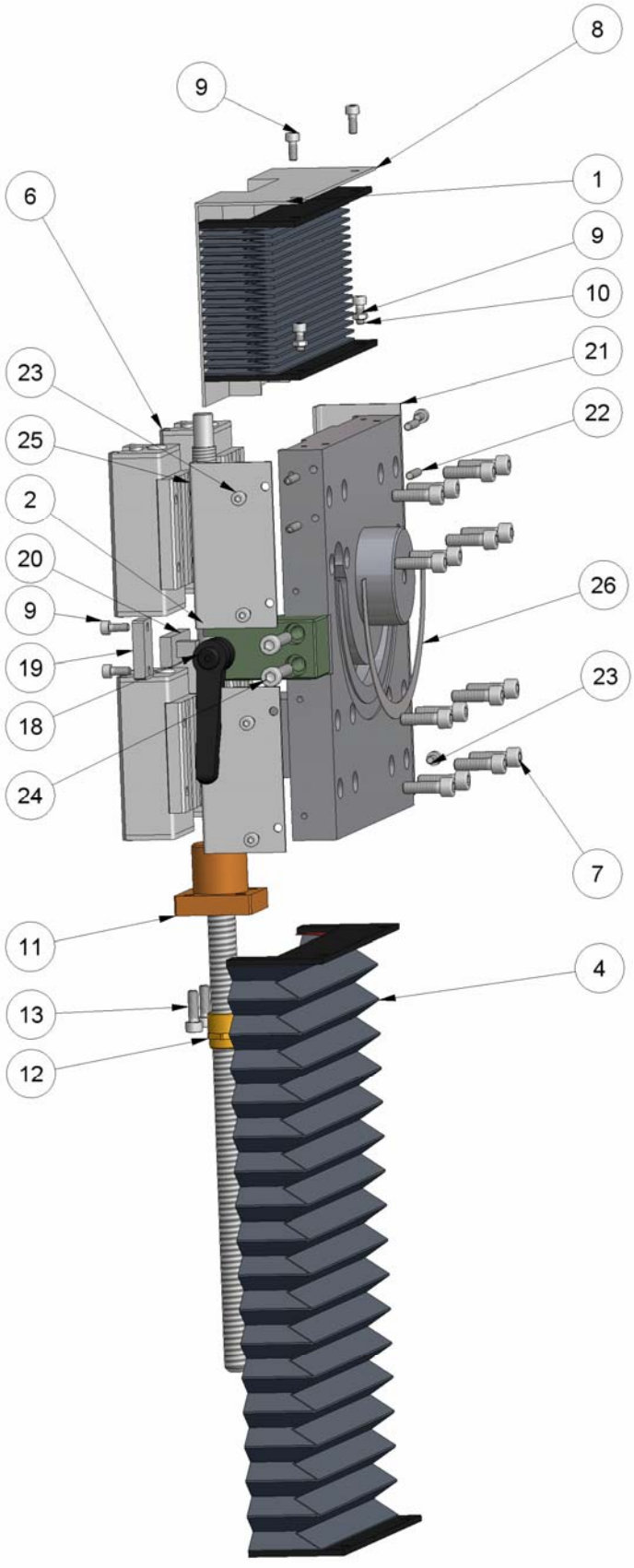
F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	16400301	Z-Column
2	1	16400203	Base plate
3	1	11200320	Cover plate
4	4	11700033	Screw
5	4	11700034	Spring lock washer
6	2	11700035	Hexagon nut
7	2	11810023	Guide rail 460 mm
8	29	11700031	Screw
9	2	11810024	Guide rail 580 mm
10	1	16400224	Spindle extension
11	4	11700046	Screw
12	1	16400342	bush
13	2	11700125	Screw
14	2	11700031	Screw
15	4	11700019	Nut
17	10	11700026	Screw

13. Drawing and list of parts

13.13 Vertical slide for milling machines with Linear guides with trapezoid thread spindle

F1410 LF



13. Drawing and list of parts

13.13 Vertical slide for milling machines with linear guides with trapezoid thread spindle

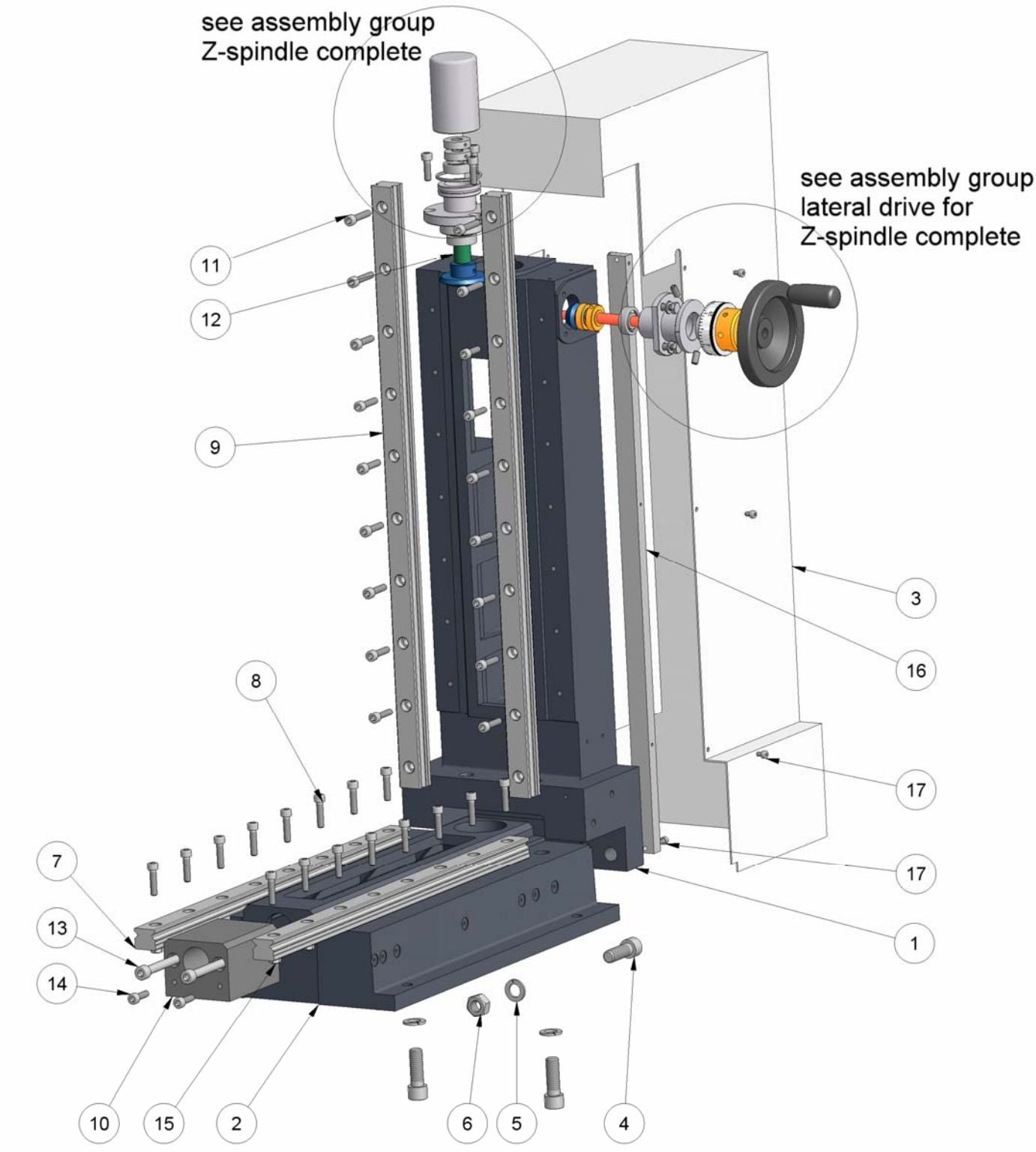
F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11860003	Concertina cover Z-axis, top
2	1	16400302	Jam
4	1	11860003	Concertina cover Z-axis, bottom
5	1	16400303	Vertical slide
6	4	11810026	Guide carriage
7	16	11700031	Cylinder screw
8	1	16410208	Holding plate Z-axis, top
9	10	11700026	Cylinder screw
10	2	11700002	Hexagon nut
11	1	16400311	Spindle nut
12	1	16400312	Adjusting nut
13	4	11700070	Cylinder screw
18	1	11840004	Clamping lever
19	1	16400319	Clamping plate
20	1	16400320	Jam
21	1	16410206	Cover plate
23	4	11700026	Cylinder screw
24	2	11700052	Cylinder screw
25	2	16410207	Cover plate
26	1	11870001	Alu scale

13. Drawing and list of parts

13.14 Z-column for milling machines with linear guides with ball screw

F1410 LF



13. Drawing and list of parts

13.14 Z-column for milling machines with linear guides with ball screw

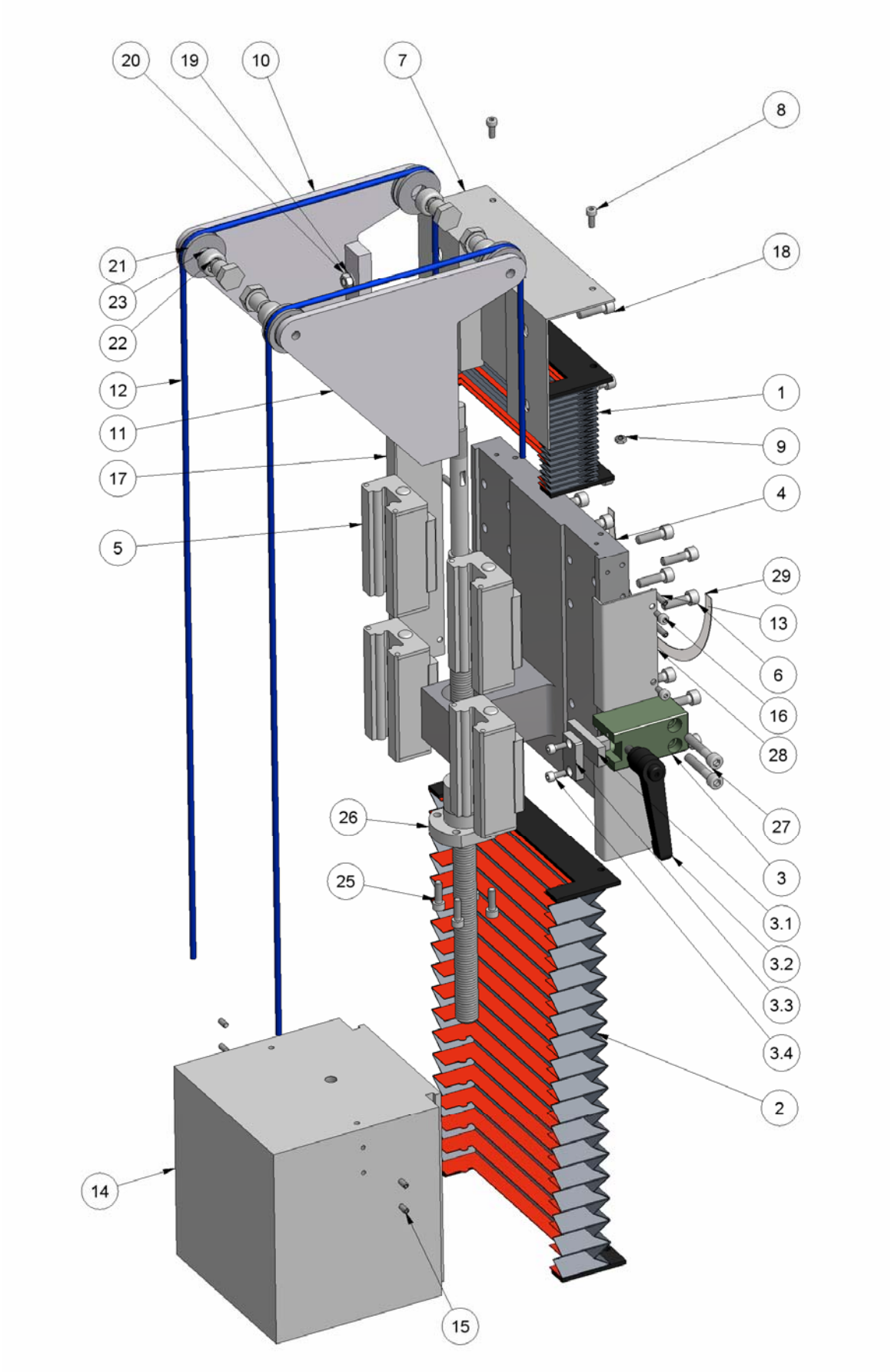
F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	16400301	Z column
2	1	16400203	Base plate
3	1	16400347	Protective cover z-axis
4	4	11700033	Screw
5	4	11700034	Spring lock washer
6	2	11700035	Hexagon nut
7	2	11810023	Guide rail 460 mm
8	29	11700031	Screw
9	2	11810024	Guide rail 580 mm
10	1	16400224	Spindle extension
11	4	11700046	Screw
12	1	16400342	Bush
13	2	11700125	Screw
14	2	11700031	Screw
15	4	11700019	Nut
16	2	16400332	Guide rails counter weight
17	10	11700026	Screw

13. Drawing and list of parts

13.15 Vertical slide for milling machines with linear guides with ball screw

F1410 LF



13. Drawing and list of parts

13.15 Vertical slide for milling machines with linear guides with ball screw

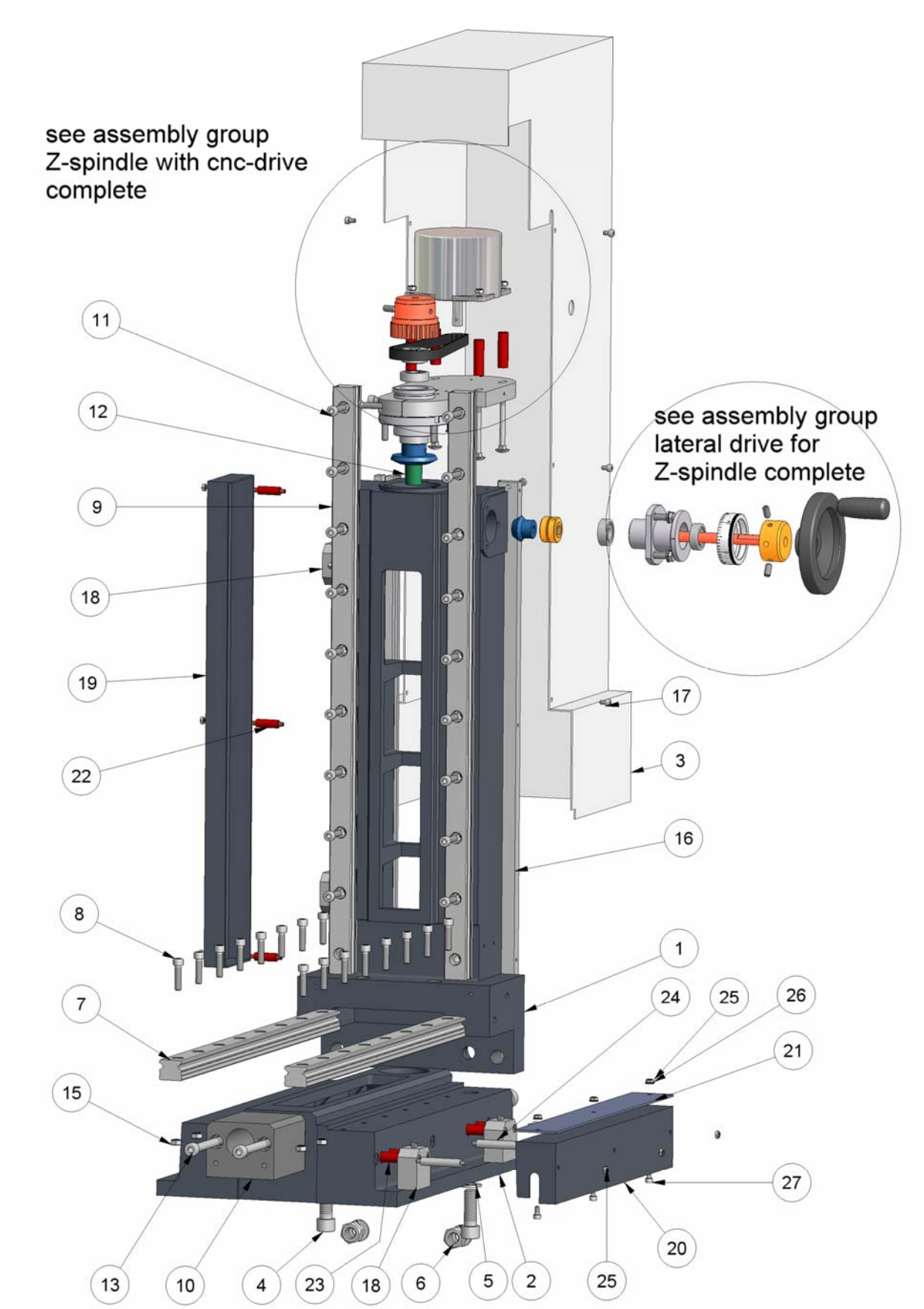
F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11860003	Concertina cover Z-axis, top
2	1	11860003	Concertina cover Z-axis,base
3	1	16400302	Jam
3.1	1	16400319	Clamping plate
3.2	1	11840004	Clamping lever
3.3	1	16400320	Jam
3.4	2	11700026	Cylinder screw
4	1	16400303	Vertical slide
5	4	11810026	Guide carriage
6	16	11700031	Cylinder screw
7	1	16410208	Holding plate Z-axis, top
8	4	11700026	Cylinder screw
9	2	11700002	Hexagon nut
10	1	16400337/01	Roller holder left
11	1	16400337/02	Roller holder right
12	2	16400341	Wire rope
14	1	16400340	Counter weight
15	4	11700089	Threaded pin
16	6	11700026	Cylinder screw
17	1	14610206	Cover plate
18	4	11700031	Cylinder screw
19	4	11700018	Limpet washer
20	4	11700019	Hexagon nut
21	4	16400339	Redirecting roller
22	4	16400338	Bolt
23	4	11810027	Needle bearing
25	4	11700070	Cylinder screw
26			Spindle nut (contained in ball screw order no.11245327)
27	2	11700052	Cylinder screw
28	2	14610207	Cover plate
29	1	11870001	Alu scale

13. Drawing and list of parts

13.16 Z-column for CNC milling machines with linear guides with ball screw

CC-F1410 LF



13. Drawing and list of parts

13.16 Z-column for CNC milling machines mit linear guides with ball screw

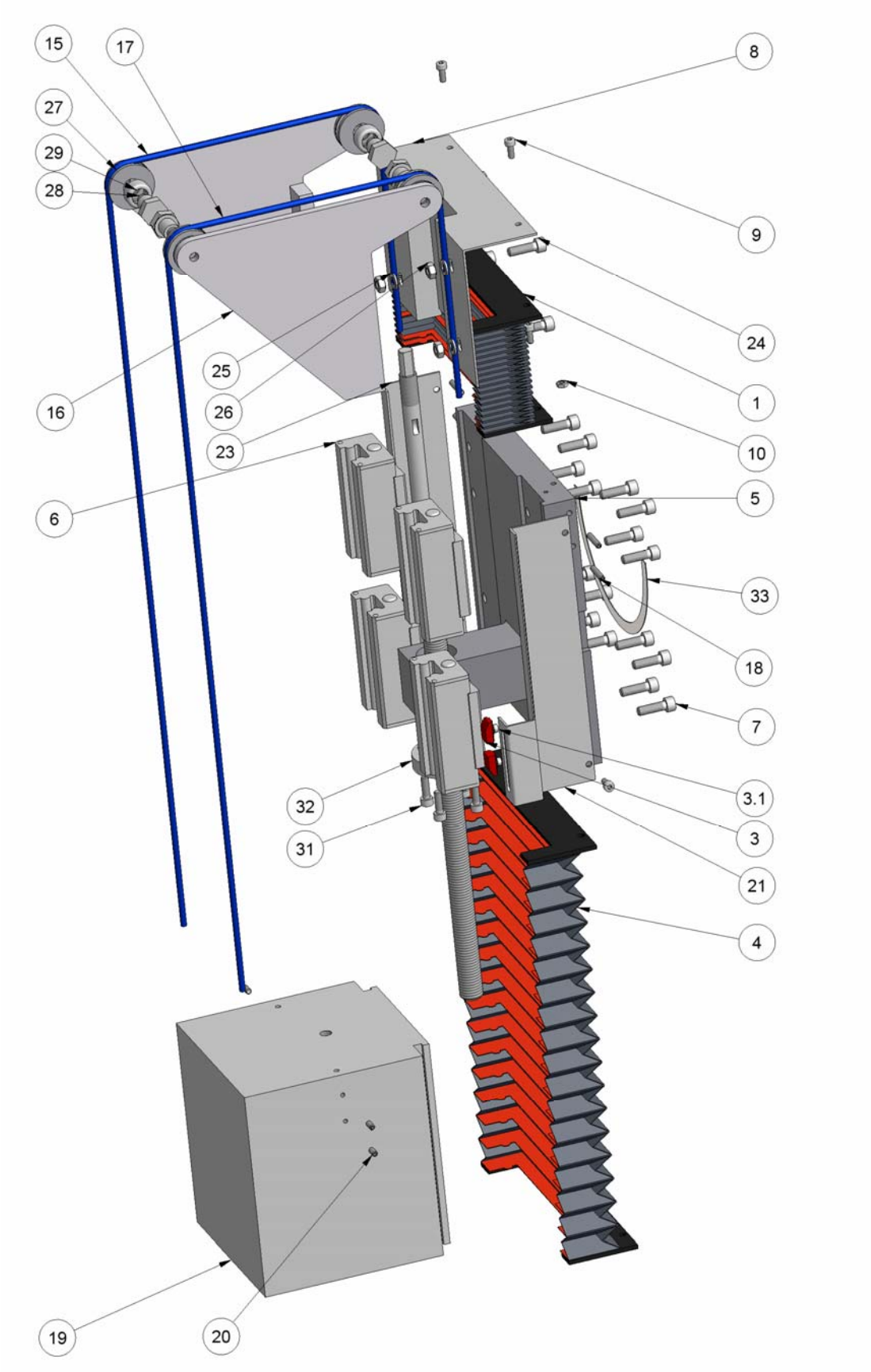
CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	16400301	Z-column
2	1	16400203	Base plate
3	1	16400347	Protective cover Z-axis
4	4	11700033	Screw
5	4	11700034	Spring lock washer
6	2	11700035	Hexagon nut
7	2	11810023	Guide rail 460 mm
8	29	11700031	Screw
9	2	11810024	Guide rail 580 mm
10	1	16400224	Spindle extension
11	4	11700046	Screw
12	1	16400342	Liner
13	2	11700125	Screw
15	4	11700019	Nut
16	2	16400332	Guide rail counter weight
17	10	11700026	Screw
18	4	11900017	Limit switch
19	1	16410205	Limit switch cover Z-axis
20	1	16410204	Limit switch cover Y-axis
21	1	16400206	Rubber plate
22	3	16400211	Distance piece limit switch
23	4	16400205	Limit switch holder
24	3	16400212	Distance piece limit switch
25	9	11700002	Nut
26	3	11700038	Limpet washer
27	3	11700031	Screw

13. Drawing and list of parts

13.17 Vertical slide for CNC milling machines with linear guides with ball screw

CC-F1410 LF



13. Drawing and list of parts

13.17 Vertical slide for CNC milling machines with linear guides with ball screw

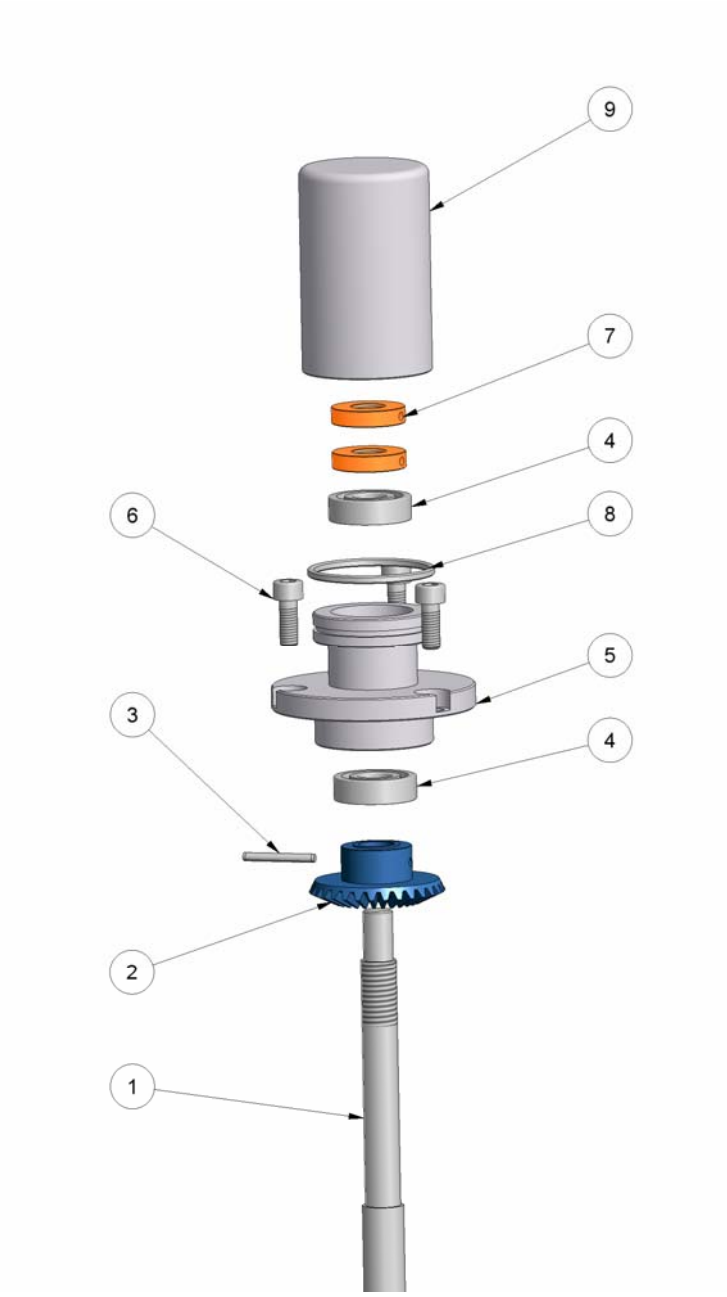
CC-F1410 LF

Part-No.	Pieces	Order-No.	Designation
1	1	11860003	Concertina cover Z-axis, top
3	2	16400227	Switch cam
3.1	2	11700112	Hexagon cylinder screw
4	1	11860003	Concertina cover Z-axis, base
5	1	16400303	Vertical slide
6	4	11810026	Guide carriage
7	16	11700031	Cylinder screw
8	1	16410208	Holding plate Z-axis, top
9	4	11700026	Cylinder screw
10	2	11700002	Hexagon nut
15	1	16400337/01	Roller holder left
16	1	16400337/02	Roller holder right
17	2	16400341	Wire rope
18	4	11700089	Threaded pin
19	1	16400330	Counter weight
20	4	11700089	Threaded pin
21	1	16410209	Switch cam support plate
22	4	11700026	Cylinder screw
23	1	16410206	Cover plate
24	4	11700031	Cylinder screw
25	4	11700018	Washer
26	4	11700019	Hexagon nut
27	4	16400339	Redirecting roller
28	4	16400338	Bolt
29	4	11810027	Needle bearing
31	4	11700070	Cylinder screw
32	1		Spindle nut (is contained in ball screw order no.11245327)
33	1	11870001	Alu scale

13. Drawing and list of parts

13.18 Z-spindle complete for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed – F1410 LF – F1410 LF high speed



Part-No.	Pieces	Order-No.	Designation
1	1	11200327	Spindle *for milling machines with trapezoid thread spindle*
	1	11245327	Spindle with Spindle nut *for milling machines with ball screw*
2	1	112003226	Bevel gear
3	1	11700027	Spiral pin
4	2	11810007	Ball bearing
5	1	112003224	Spindle flange
6	3	11700031	Screw
7	2	112003222	Adjusting nut
8	1	11810025	O-ring
9	1	11200325	Cover

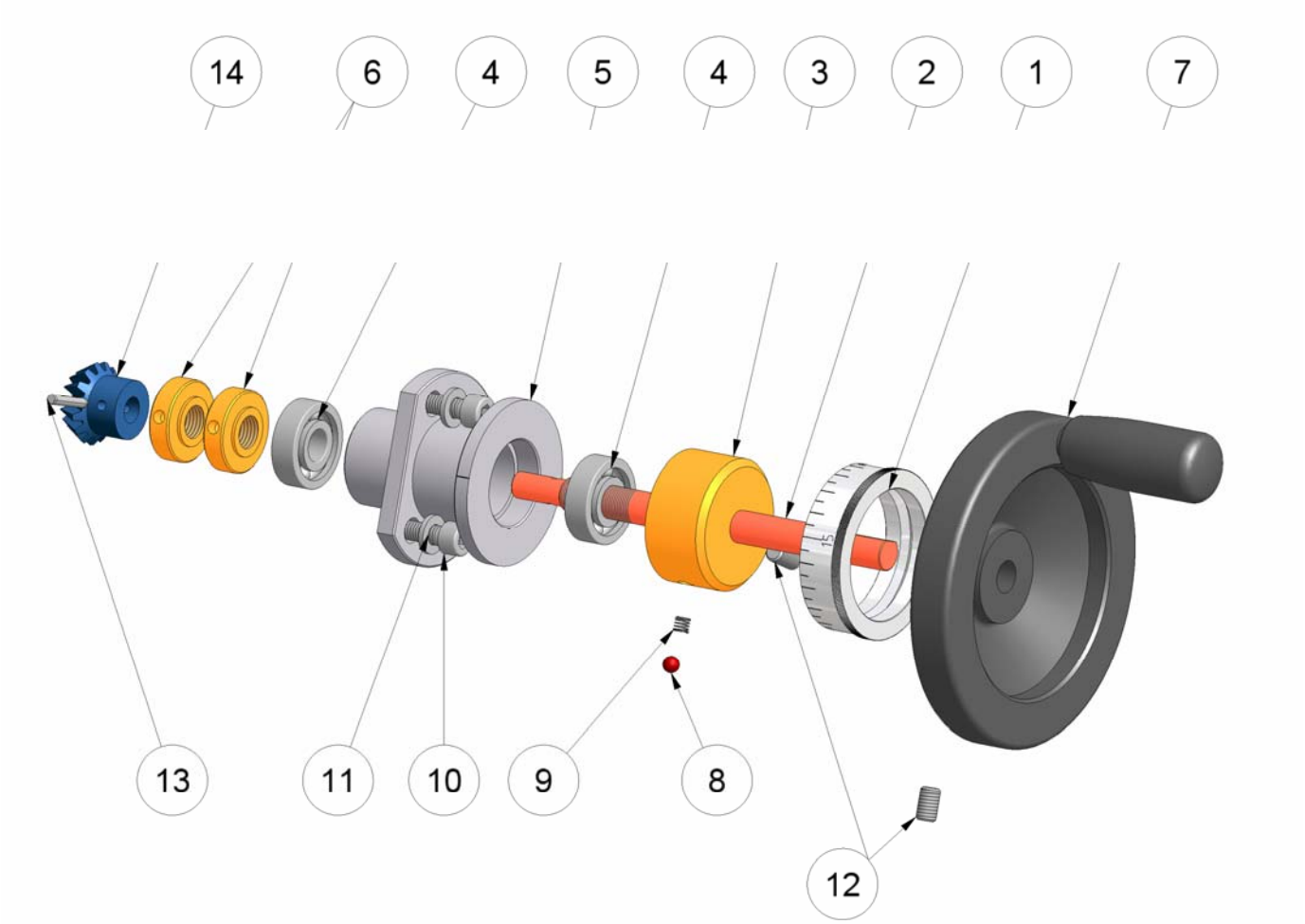
13. Drawing and list of parts

13.19 Lateral drive for Z-spindle complete for milling machines

F1200 – F1200 high speed – CC-F1200 – CC-F1200 high speed

F1210 – F1210 high speed – CC-F1210 – CC-F1210 high speed

F1410 LF – F1410 LF high speed – CC-F1410 LF - CC-F1410 LF high speed



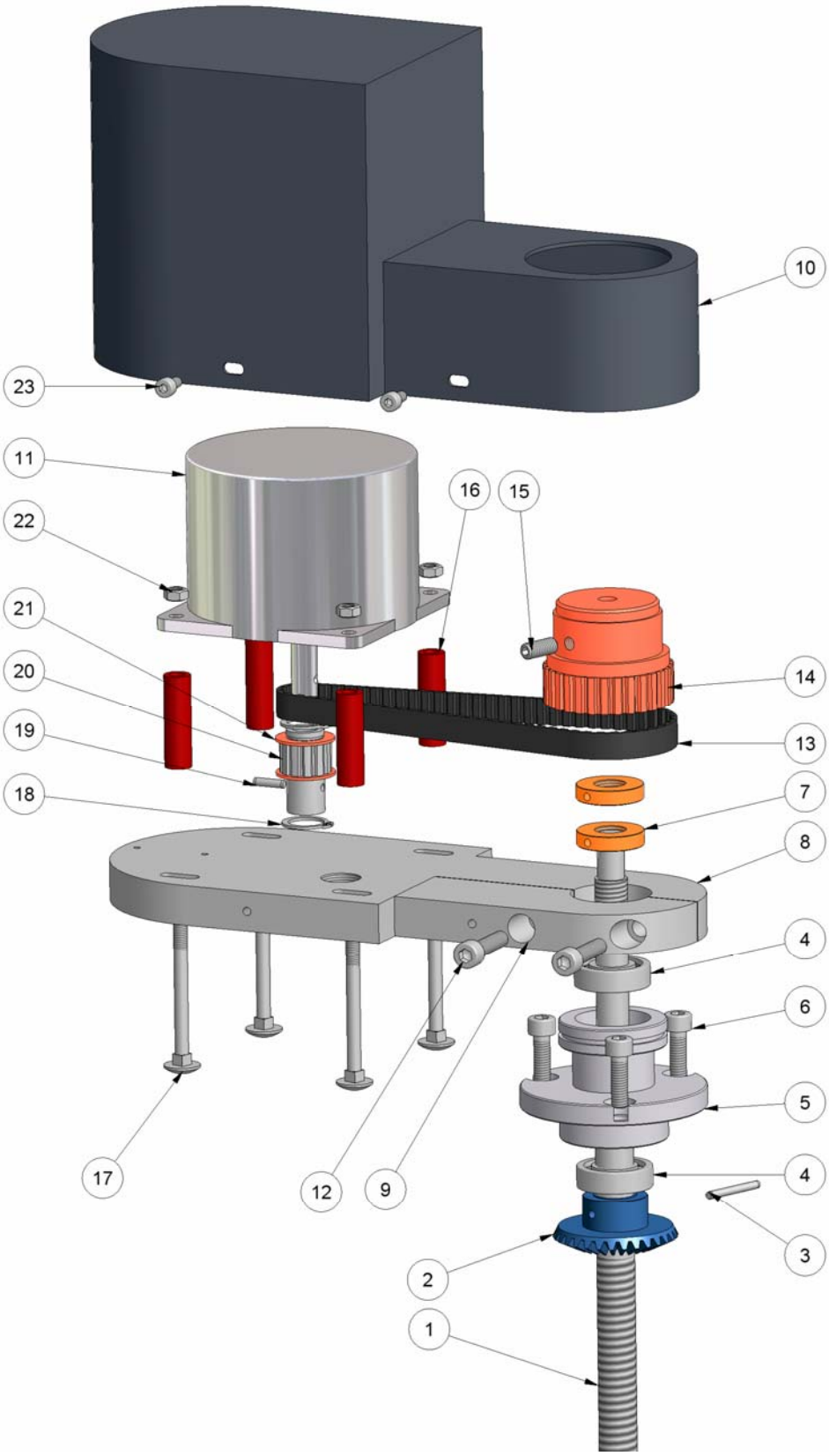
Part-No.	Pieces	Order-No.	Designation
1	1	112003187	Scale ring (40 graduation marks) *for milling machines with trapezoid thread spindle*
	1	112453187	Graduated collar (50 graduation marks) *for milling machines with ball screw*
2	1	112003183	Spindle
3	1	1120031810	Adjusting ring
4	2	11810003	Ball bearing
5	1	112003186	Spindle flange
6	2	112003184	Adjusting nut
7	1	11840005	Handwheel
	1	11840003	Hinged handwheel *for CNC milling machines*
8	1	11810004	Ball
9	1	11850002	Spring
10	3	11700031	Screw
11	3	11700018	Limpet washer
12	2	11700087	Threaded pin
13	1	11700023	Spiral pin
14	1	112003182	Bevel gear

13. Drawing and list of parts

13.20 Z-spindle with CNC drive complete for milling machines

CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed

CC-F1410 LF – CC-F1410 LF high speed



13. Drawing and list of parts

13.20 Z-spindle with CNC drive complete for milling machines

CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed

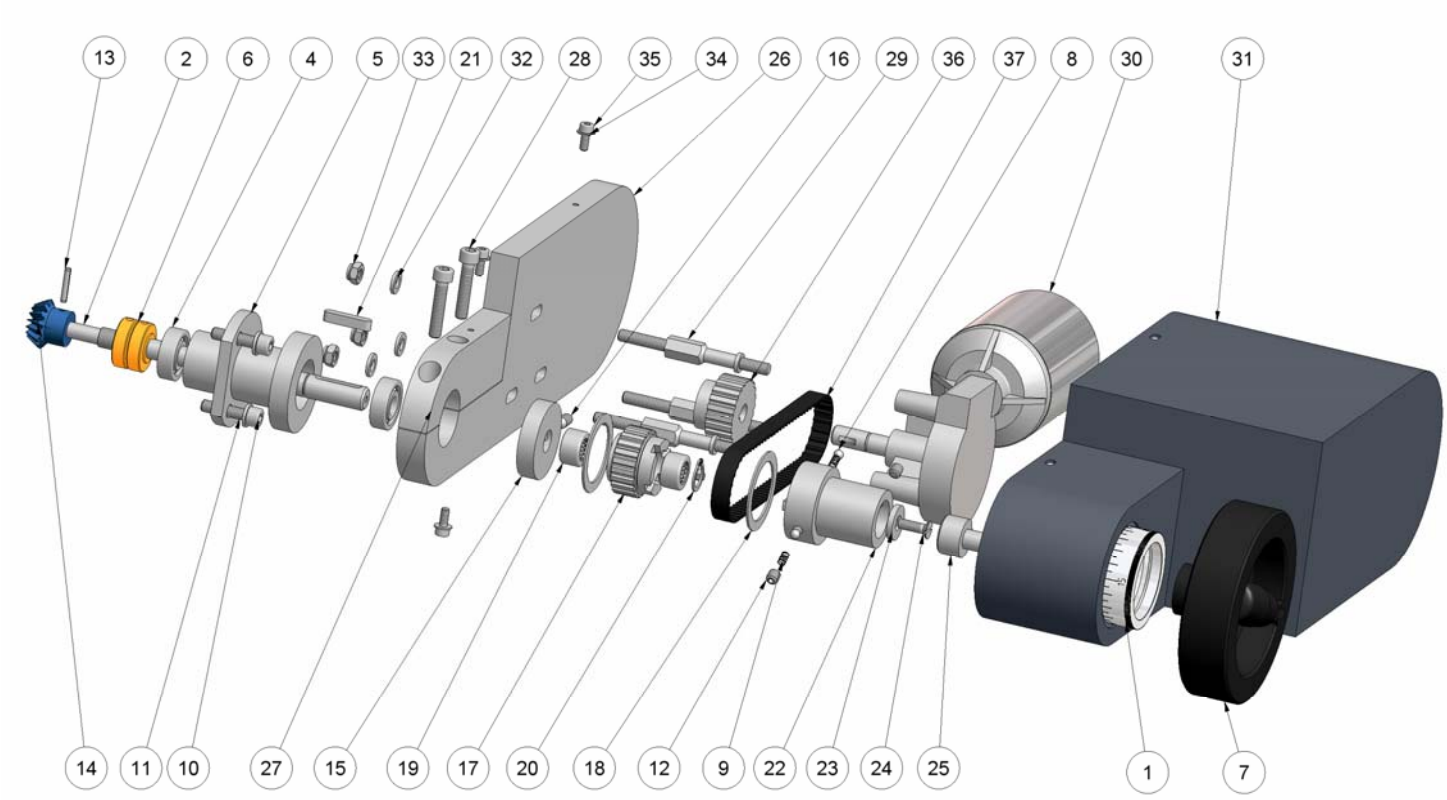
CC-F1410 LF – CC-F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200327	Spindle *for milling machines with trapezoid thread spindle*
	1	11245327	Spindle with spindle nut *for milling machines with ball screw*
2	1	112003226	Bevel gear
3	1	11700027	Spiral pin
4	2	11810007	Ball bearing
5	1	112003224	Spindle flange
6	3	11700031	Screw
7	2	112003222	Adjusting nut
8	1	112103192	Motor support
9	1	112103193	Jam motor holder
10	1	1121031917	Protective cover (not required for linear guide machine with ball screw)
11	1	11800003	Stepper motor *nccad basic*
	1	11800028	Stepper motor *nccad professional*
12	2	11700046	Screw
13	1	11820003	Belt
14	1	112103196	Toothed belt pulley
15	1	11700009	Threaded pin
16	4	112103195	Distance piece
17	4	11700047	Truss head bolt
18	2	11700048	Lock ring
19	1	11700049	Spiral pin
20	1	1121021213	Belt pulley
21	2	1121021212	Flanged wheel
22	4	11700050	Nut
23	4	11700026	Screw

13. Drawing and list of parts

13.21 Lateral drive for Z-spindle with automatic feed complete for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed – F1410 LF – F1410 LF high speed



13. Drawing and list of parts

13.21 Lateral drive for Z-spindle with automatic feed complete for milling machines

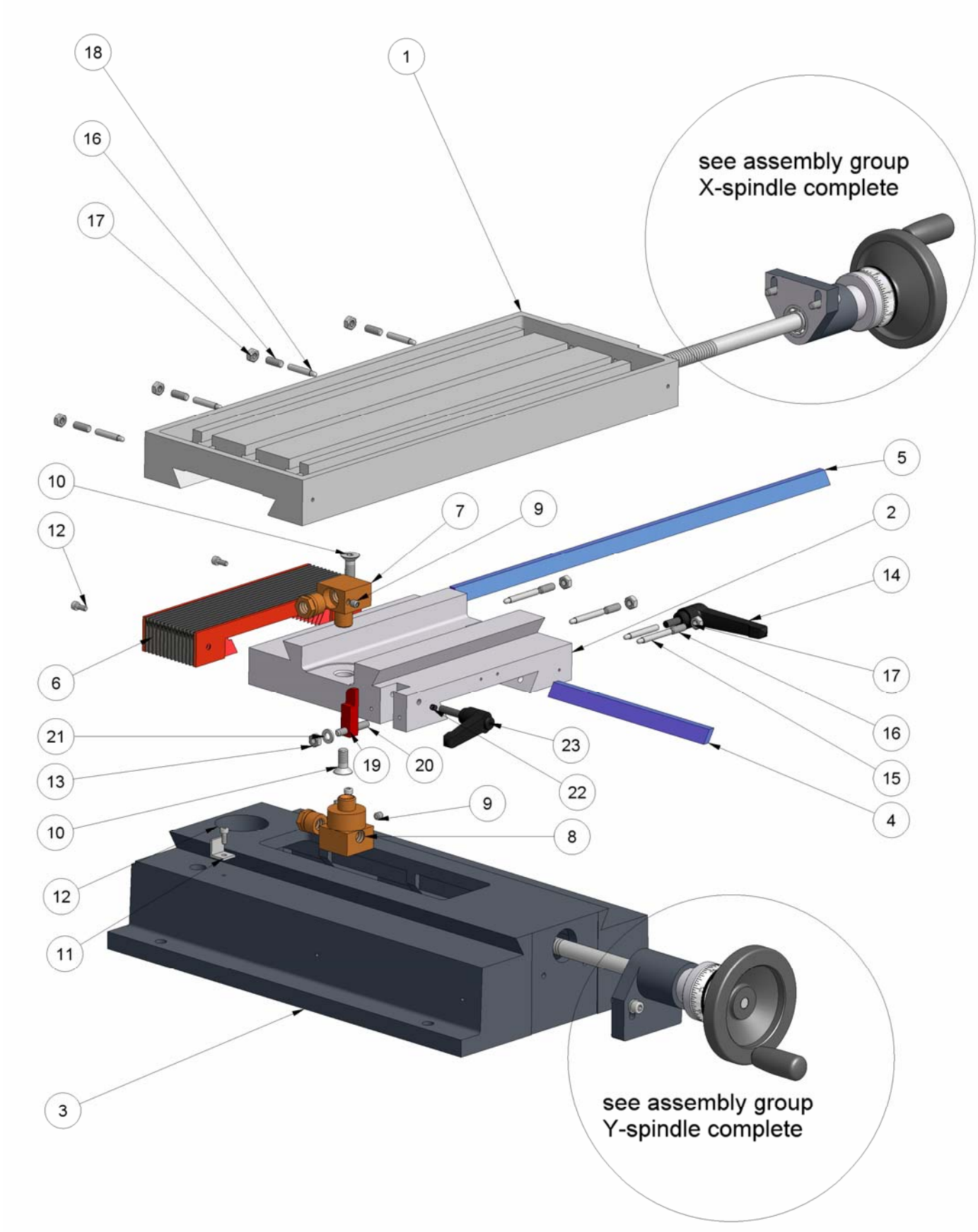
F1200 – F1200 high speed – F1210 – F1210 high speed – F1410 LF – F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	112003187	Scale ring (40 graduation marks) *for milling machines with trapezoid thread spindle*
	1	112453187	Graduated collar (50 graduation marks) *for milling machines with ball screw*
2	1	11204101	Threaded spindle
4	2	11810003	Ball bearing
5	1	112043186	Spindle flange
6	2	112003184	Adjusting nut
7	1	11840003	Hinged handwheel
8	1	11810004	Ball
9	1	11850002	Spring
10	3	11700031	Screw
11	3	11700018	Washer
12	2	11700087	Threaded pin
13	1	11700023	Spiral pin
14	1	112003182	Bevel gear
15	1	11204104	Thrust washer
16	1	11700087	Threaded pin
17	1	11204106	Belt pulley
18	2	11204105	Flanged wheel
19	2	11810027	Needle bearing
20	1	11700042	Circlip
21	1	11700043	Feather key
22	1	11204108	Coupling
23	1	11204109	Connecting washer
24	1	11700130	Flat-headed screw
25	1	11204110	Handwheel extension
26	1	11204112	Motor support plate
27	1	11204113	Jam motor holder
28	2	11700046	Screw
29	3	11204111	Stud bolt
30	1	11800002	Motor
31	1	11204116	Protective cover
32	3	11700018	Washer
33	3	11700020	Nut
34	4	11700038	Washer
35	4	11700026	Screw
36	1	11204114	Belt pulley
37	1	11820003	Toothed belt

13. Drawing and list of parts

13.22 Cross support for milling machines with trapezoid thread spindle

F1200 – F1200 high speed – F1210 – F1210 high speed



13. Drawing and list of parts

13.22 Cross support for milling machines with trapezoid thread spindle

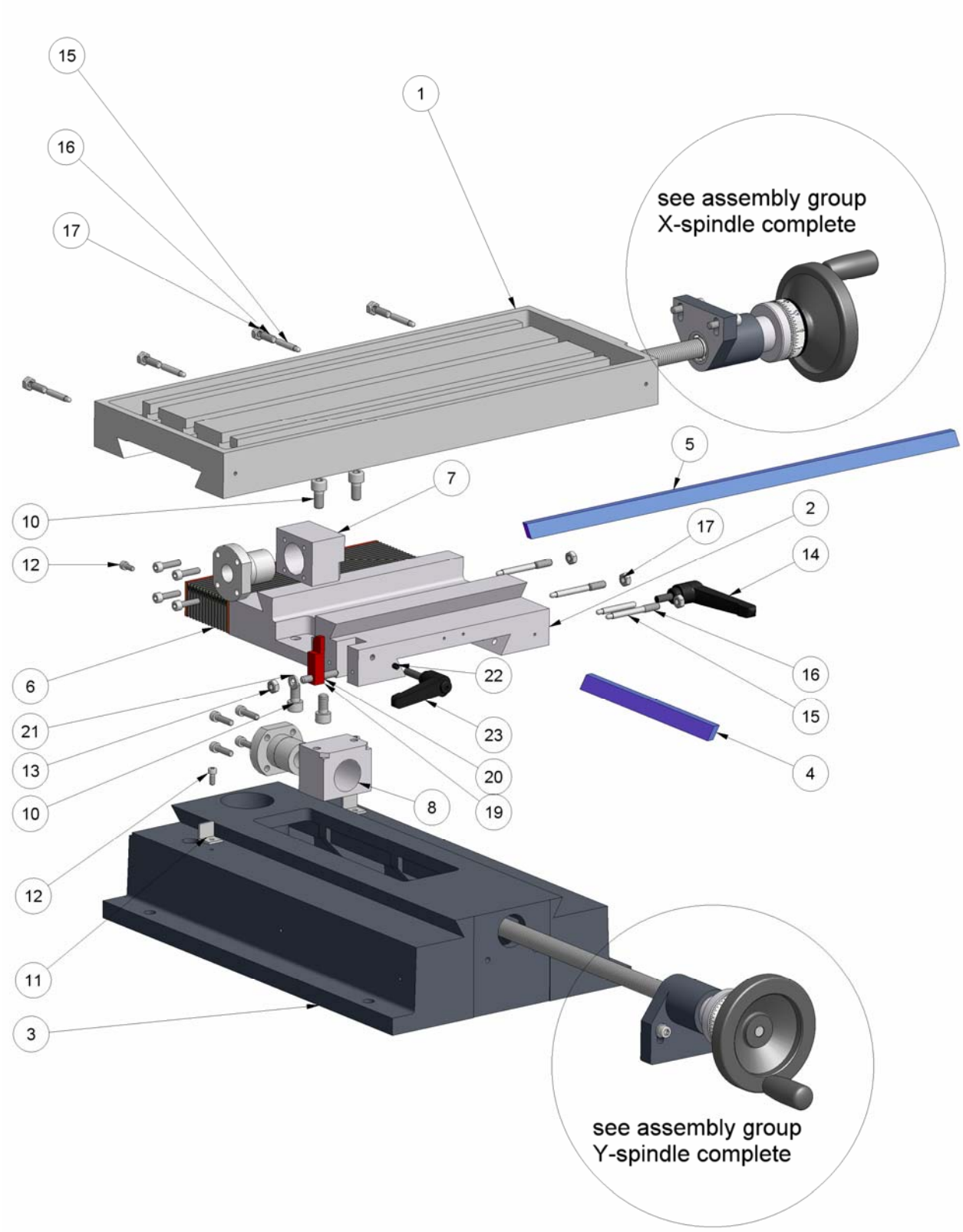
F1200 – F1200 high speed – F1210 – F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide *F1200 – F1200 high speed*
1	1	11400201	Top slide *F1210 – F1210 high speed*
2	1	11200202	Cross slide
3	1	11200203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip *F1200 – F1200 high speed*
5	1	11400205	Adjusting strip *F1210 – F1210 high speed*
6	1	11860002	Concertina cover
7	1	11200208	Spindle nut with adjusting nut
8	1	11200209	Spindle nut with adjusting nut
9	2	11700009	Threaded pin
10	2	11700126	Flat-headed screw
11	2	11200228	Alu angle
12	4	11700026	Screw
13	1	11700020	Lock nut
14	1	11840004	Clamping lever
15	4	11200216	Thrust piece
16	7	11700123	Threaded pin
17	7	11700019	Nut
18	4	11200217	Thrust piece
19	1	11200219	Clamping piece
20	1	11700032	Stud bolt
21	1	11700018	Washer
22	1	11850003	Spring
23	1	11840006	Clamping lever

13. Drawing and list of parts

13.23 Cross support for milling machines with ball screw

F1200 – F1200 high speed – F1210 – F1210 high speed



13. Drawing and list of parts

13.23 Cross support for Milling machines with ball screw

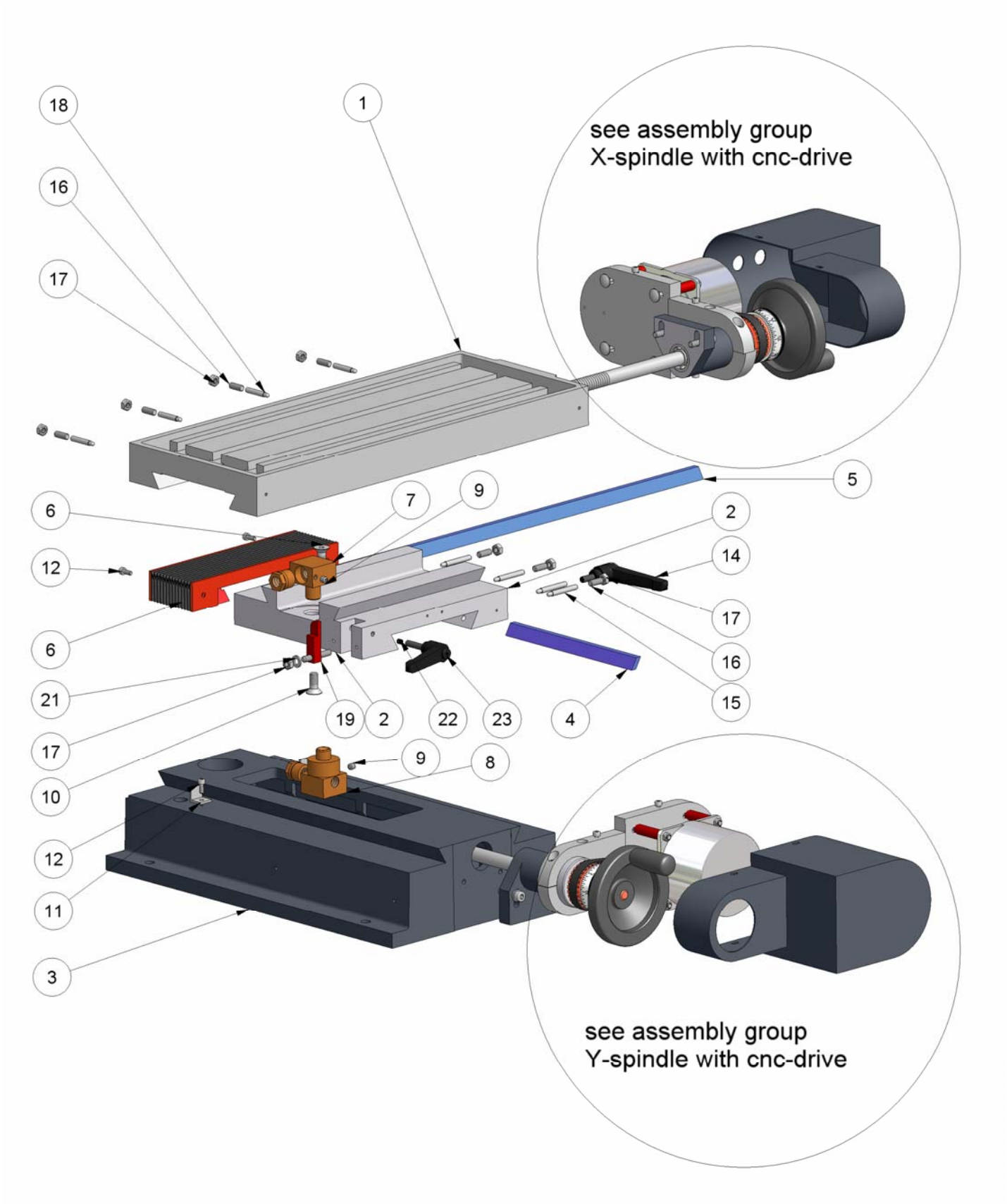
F1200 – F1200 high speed – F1210 – F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide *F1200 – F1200 high speed*
1	1	11400201	Top slide *F1210 – F1210 high speed*
2	1	11245202	Cross slide
3	1	11200203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip *F1200 – F1200 high speed*
5	1	11400205	Adjusting strip *F1210 – F1210 high speed*
6	1	11860002	Concertina cover
7	1	11245208	Nut holder A-axis
8	1	11245209	Nut holder Y-axis
9	8	11700039	Screw
10	4	11700040	Screw
11	2	11200228	Alu angle
12	4	11700026	Screw
13	1	11700020	Lock nut
14	1	11840004	Clamping lever
15	4	11200216	Thrust piece
16	7	11700123	Threaded pin
17	7	11700019	Nut
18	4	11200217	Thrust piece
19	1	11200219	Clamping piece
20	1	11700032	Stud bolt
21	1	11700018	Washer
22	1	11850003	Spring
23	1	11840006	Clamping lever

13. Drawing and list of parts

13.24 Cross support for CNC milling machines with trapezoid thread spindle

CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed



13. Drawing and list of parts

13.24 Cross support for CNC milling machines with trapezoid thread spindle

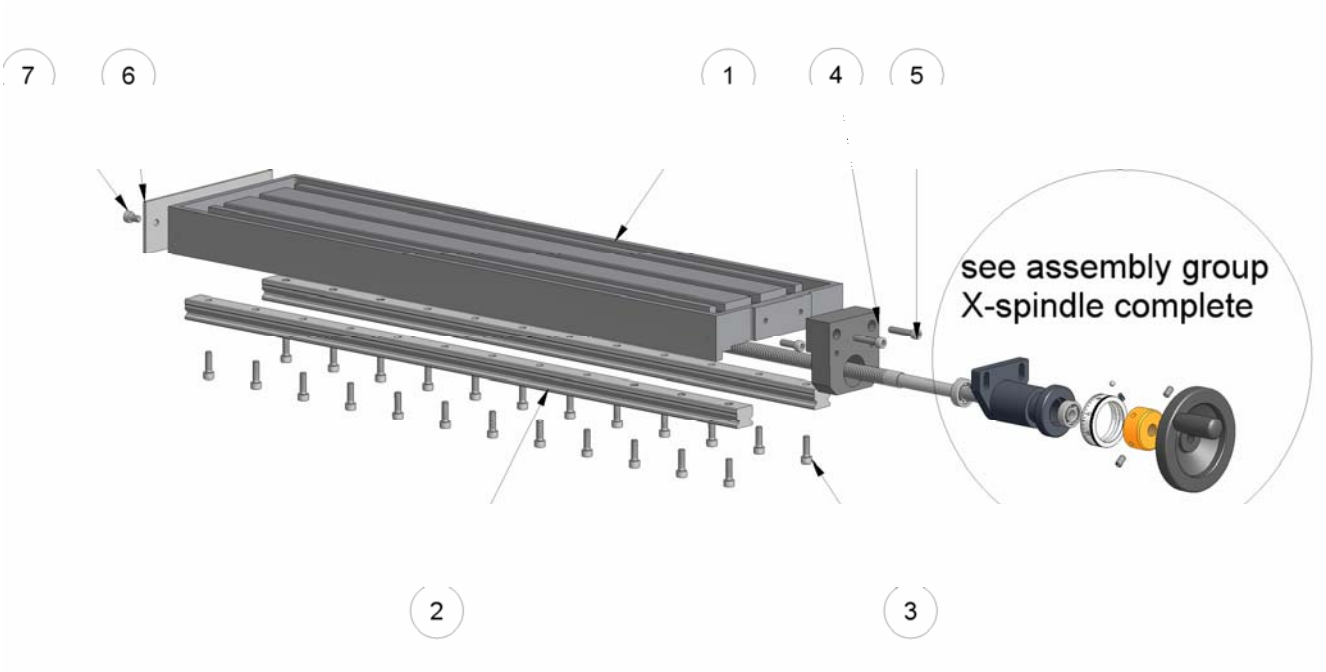
CC-F1200 – CC-F1200 high speed – CC-F1210 – CC-F1210 high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide *F1200 – F1200 high speed*
1	1	11400201	Top slide *F1210 – F1210 high speed*
2	1	11200202	Cross slide
3	1	11200203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip *F1200 – F1200 high speed*
5	1	11400205	Adjusting strip *F1210 – F1210 high speed*
6	1	11860002	Concertina cover
7	1	11200208	Spindle nut with adjusting nut
8	1	11200209	Spindle nut with adjusting nut
9	2	11700009	Threaded pin
10	2	11700126	Flat-headed screw
11	2	11200228	Alu angle
12	4	11700026	Screw
13	1	11700020	Lock nut
14	1	11840004	Clamping lever
15	4	11200216	Thrust piece
16	7	11700123	Headless pin
17	7	11700019	Nut
18	4	11200217	Thrust piece
19	1	11200219	Clamping piece
20	1	11700032	Stud bolt
21	1	11700018	Washer
22	1	11850003	Spring
23	1	11840006	Clamping lever

13. Drawing and list of parts

13.25 Top slide for milling machines with linear guides

F1410 LF

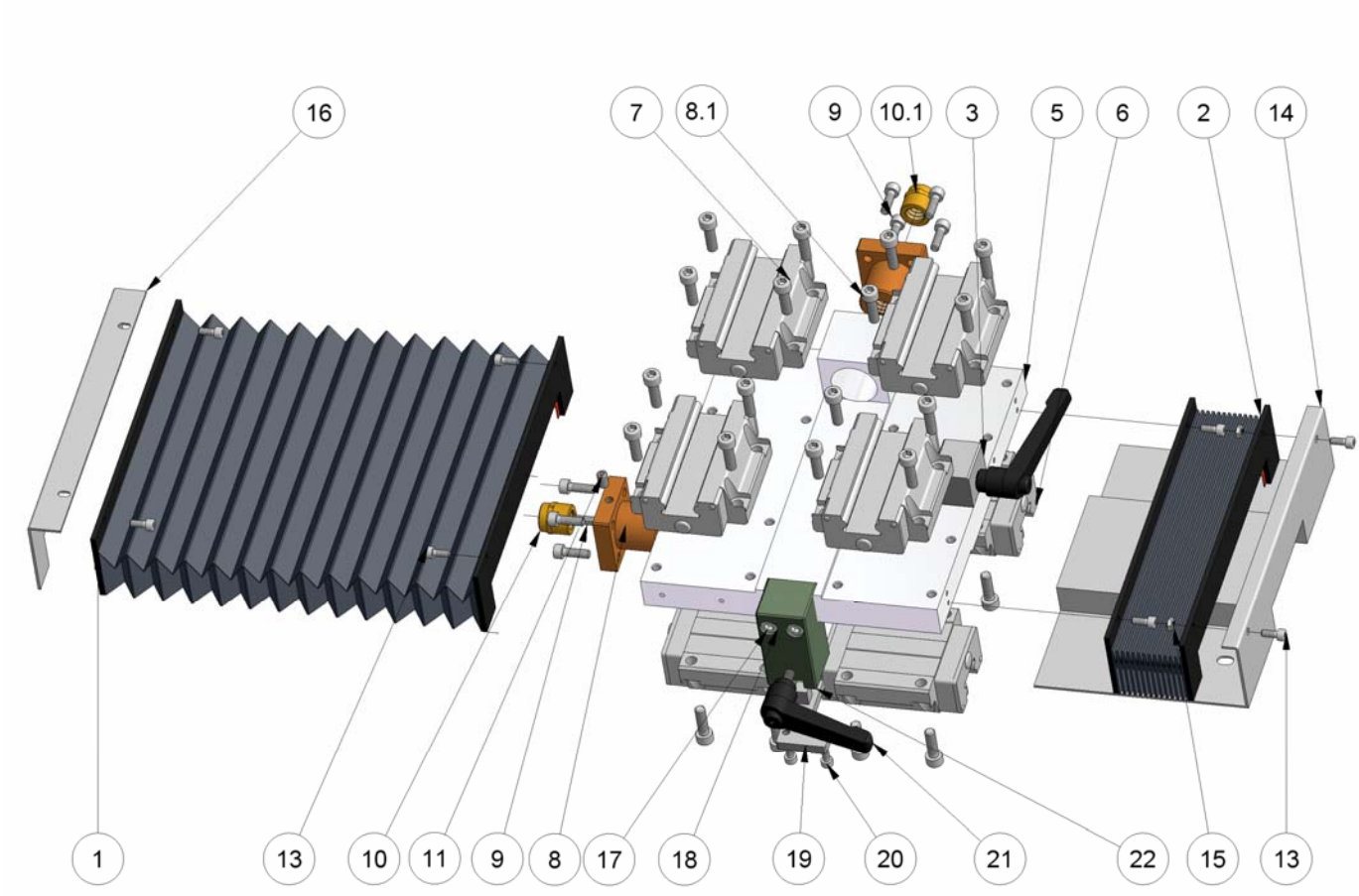


Part-No.	Pieces	Order-No.	Designation
1	1	16400201	Top slide
2	2	11810028	Guide rail 700 mm
3	26	11700031	Cylinder screw
4	1	16400212	Spindle extension X-axis
5	2	11700046	Cylinder screw
6	1	16410210	Connecting plate
7	2	11700022	Cylinder screw

13. Drawing and list of parts

13.26 Cross slide for milling machines with linear guides and trapezoid thread spindle

F1410 LF

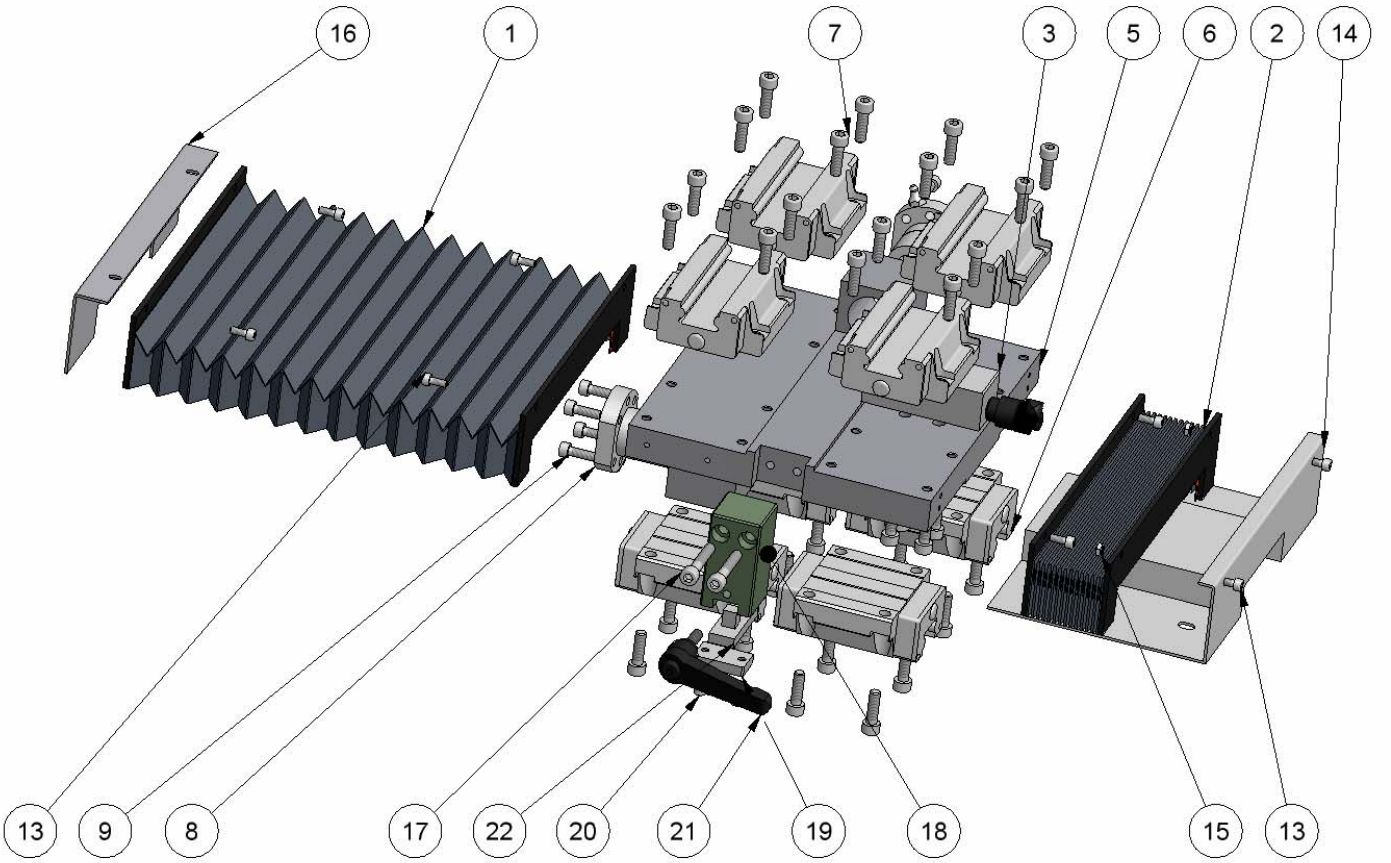


Part-No.	Pieces	Order-No.	Designation
1	1	11860004	Concertina cover, rear
2	1	11860004	Concertina cover, front
3	1	11810029	Jam complete
5	1	16400202	Cross slide
6	8	11810026	Guide carriage
7	32	11700031	Cylinder screw
8	1	16400208	Nut
8.1	1	16400311	Nut
9	8	11700070	Cylinder screw
10	1	16400209	Adjusting nut
10.1	1	16400312	Adjusting nut
11	2	11700087	Threaded pin
13	8	11700070	Cylinder screw
14	1	16410212	Holding plate
15	2	11700002	Hexagon nut
16	1	16410213	Holding plate
17	2	11700052	Cylinder screw
18	1	16400302	Jam housing
19	1	16400319	Jam plate
20	2	11700026	Cylinder screw
21	1	11840006	Clamping lever
22	1	16400320	Jam

13. Drawing and list of parts

13.27 Cross slide for milling machines with linear guides and ball screw

F1410 LF

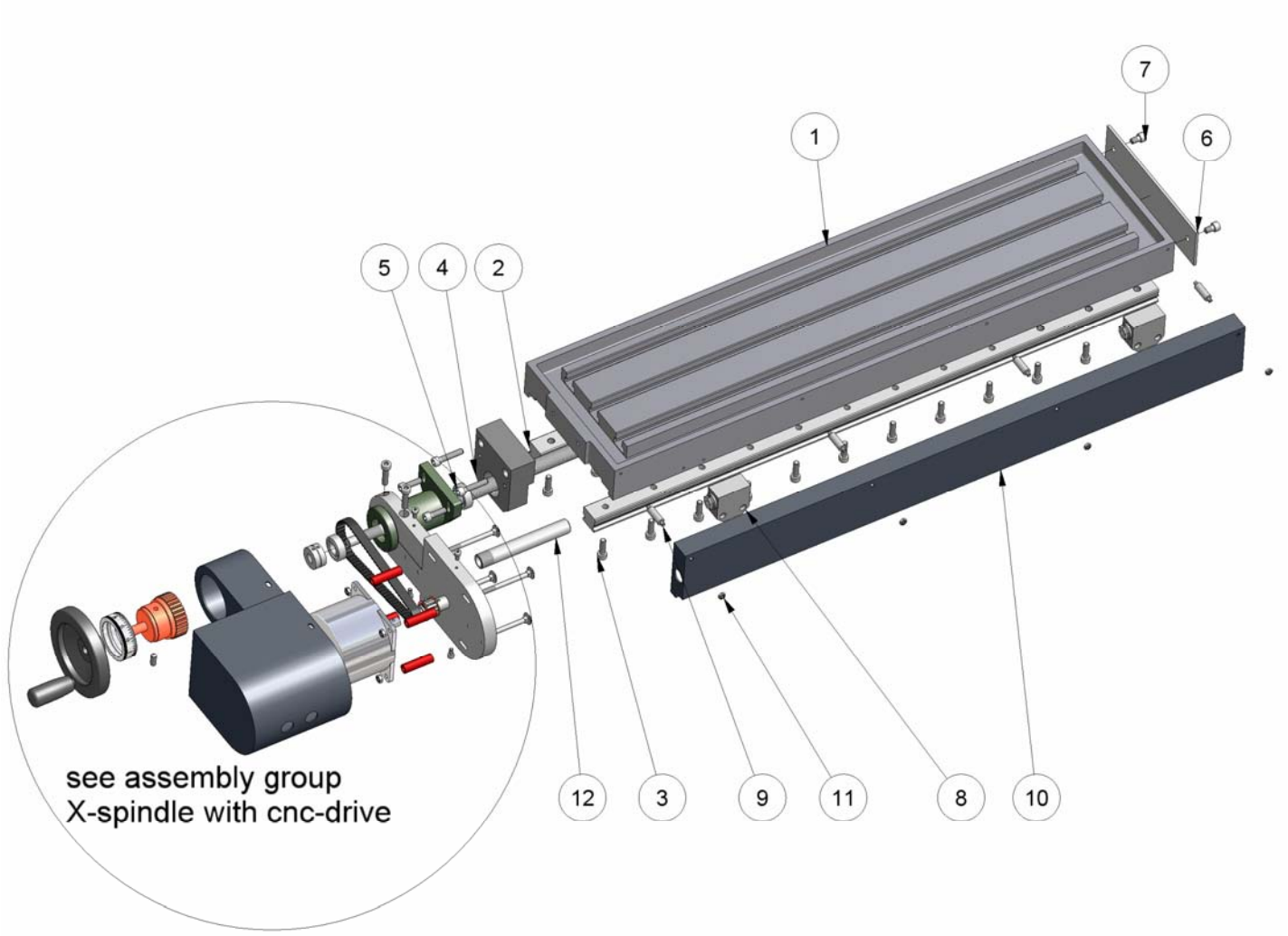


Part-No.	Pieces	Order-No.	Designation
1	1	11860004	Concertina cover, rear
2	1	11860004	Concertina cover, front
3	1	11810029	Jam complete
5	1	16400202	Cross slide
6	8	11810026	Guide carriage
7	32	11700031	Cylinder screw
8	2		Spindle nut (is contained in ball screw)
9	8	11700070	Cylinder screw
13	8	11700070	Cylinder screw
14	1	16410212	Holding plate
15	2	11700002	Hexagon nut
16	1	16410213	Holding plate
17	2	11700052	Cylinder screw
18	1	16400302	Clamper housing
19	1	16400319	Jam plate
20	2	11700026	Cylinder screw
21	1	11840006	Clamping lever
22	1	16400320	Jam

13. Drawing and list of parts

13.28 Top slide for CNC milling machines with linear guides

CC-F1410 LF

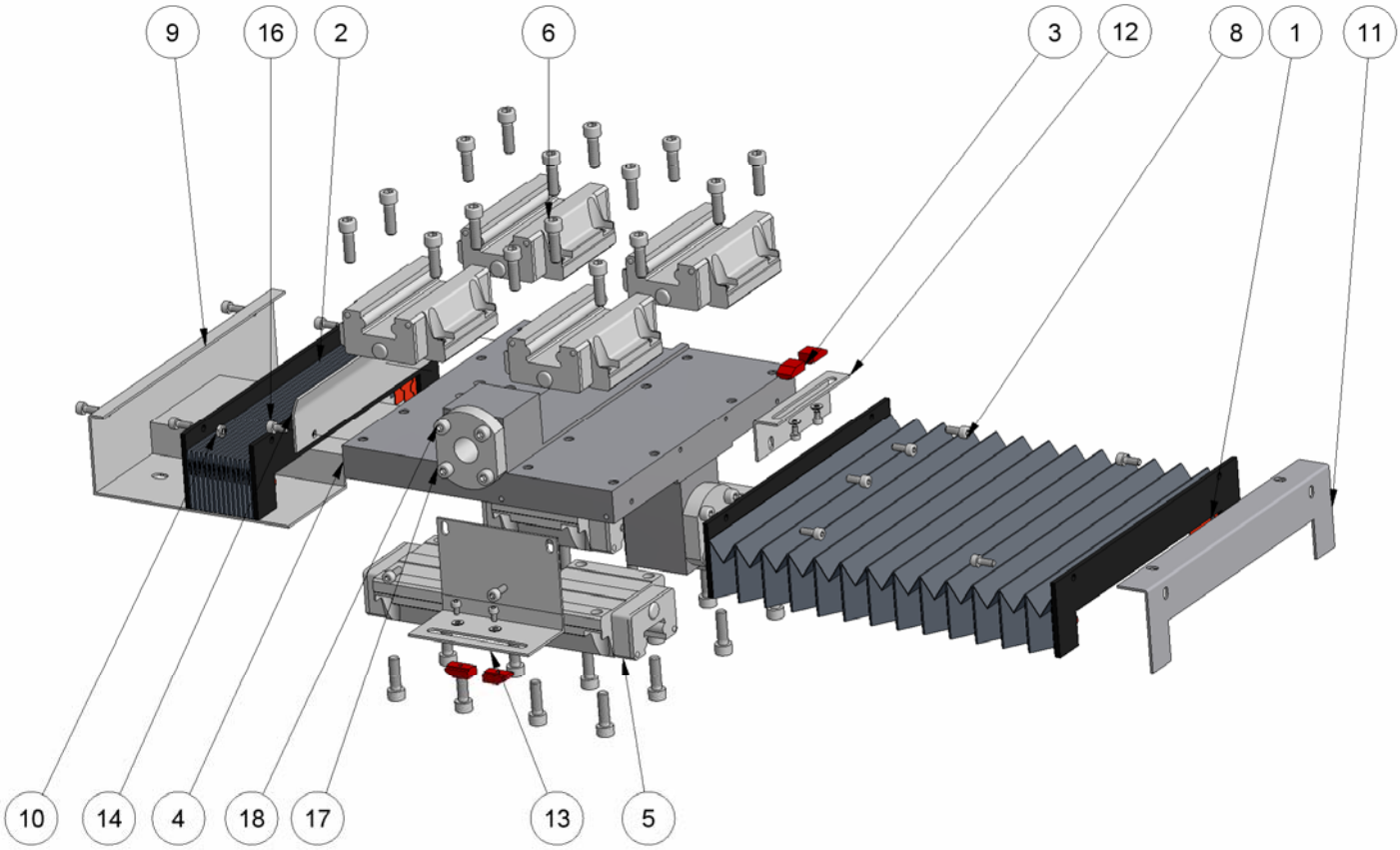


Part-No.	Pieces	Order-No.	Designation
1	1	16400201	Top slide
2	2	11810028	Guide rails 700 mm
3	26	11700031	Hexagon cylinder screw
4	1	16400212	Spindle bearing extension
5	2	11700046	Hexagon cylinder screw
6	1	16410210	Connecting plate
7	2	11700022	Hexagon cylinder screw
8	2	11900017	Limit switch
9	4	16400211	Distance piece
10	1	16410211	Cover limiting switch
11	4	11700002	Hexagon nut
12	1	16400215	Tube X-axis

13. Drawing and list of parts

13.29 Cross slide for CNC milling machines with linear guides

CC-F1410 LF

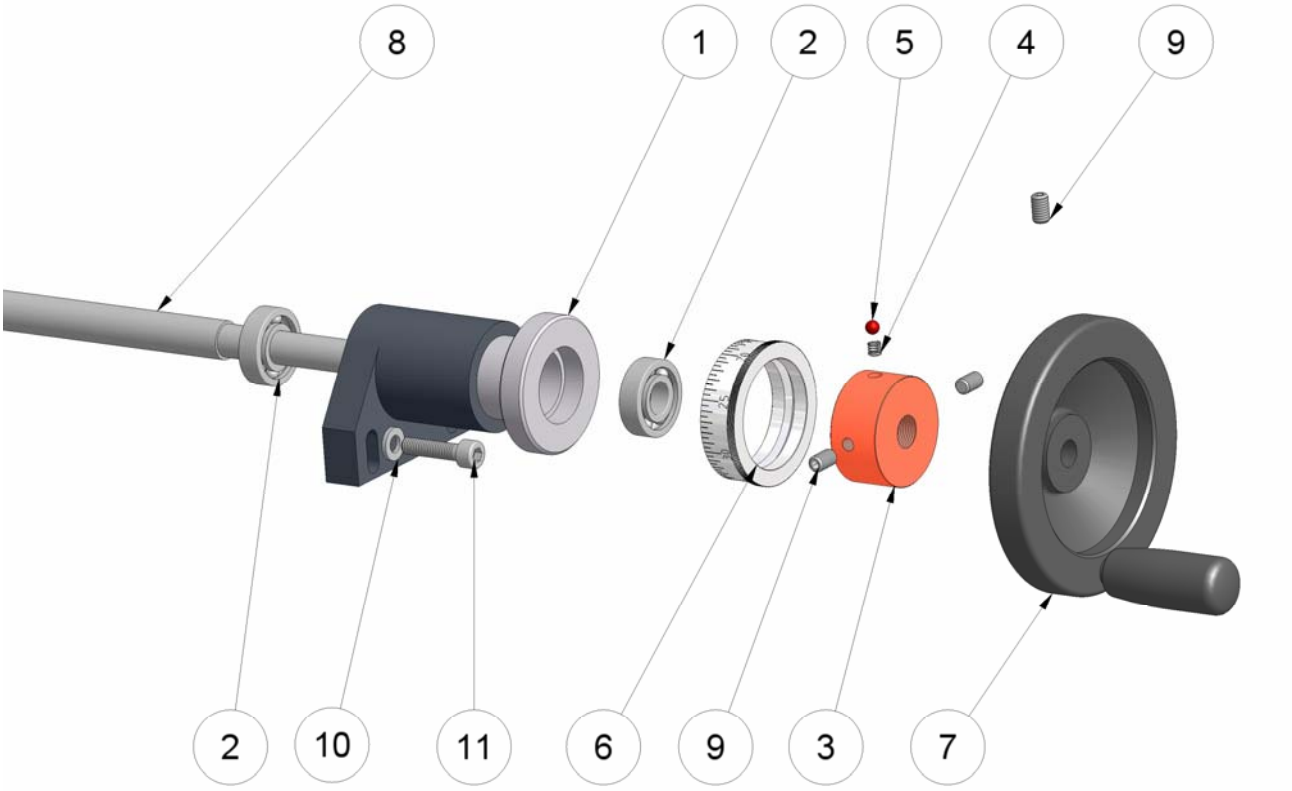


Part-No.	Pieces	Order-No.	Designation
1	1	11860004	Concertina cover
2	1	11860004	Concertina cover
3	4	16400227	Switch cams
4	1	16400202	Cross slide
5	8	11810026	Guide carriage
6	32	11700031	Cylinder screw
8	12	11700070	Cylinder screw
9	1	16410212	Holding plate Y-axis
10	2	11700002	Hexagon nut
11	1	16410213	Holding plate
12	1	16410214	Switch cam support plate X-axis
13	1	16410215	Switch cam support plate Y-axis
14	1	16410216	Linear guide cover
16	2	11700026	Cylinder screw
17	2		Spindle nut (is contained in ball screw no.16400216)
18	8	11700070	Cylinder screw

13. Drawing and list of parts

13.30 X-spindle for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed – F1410 LF – F1410 LF high speed

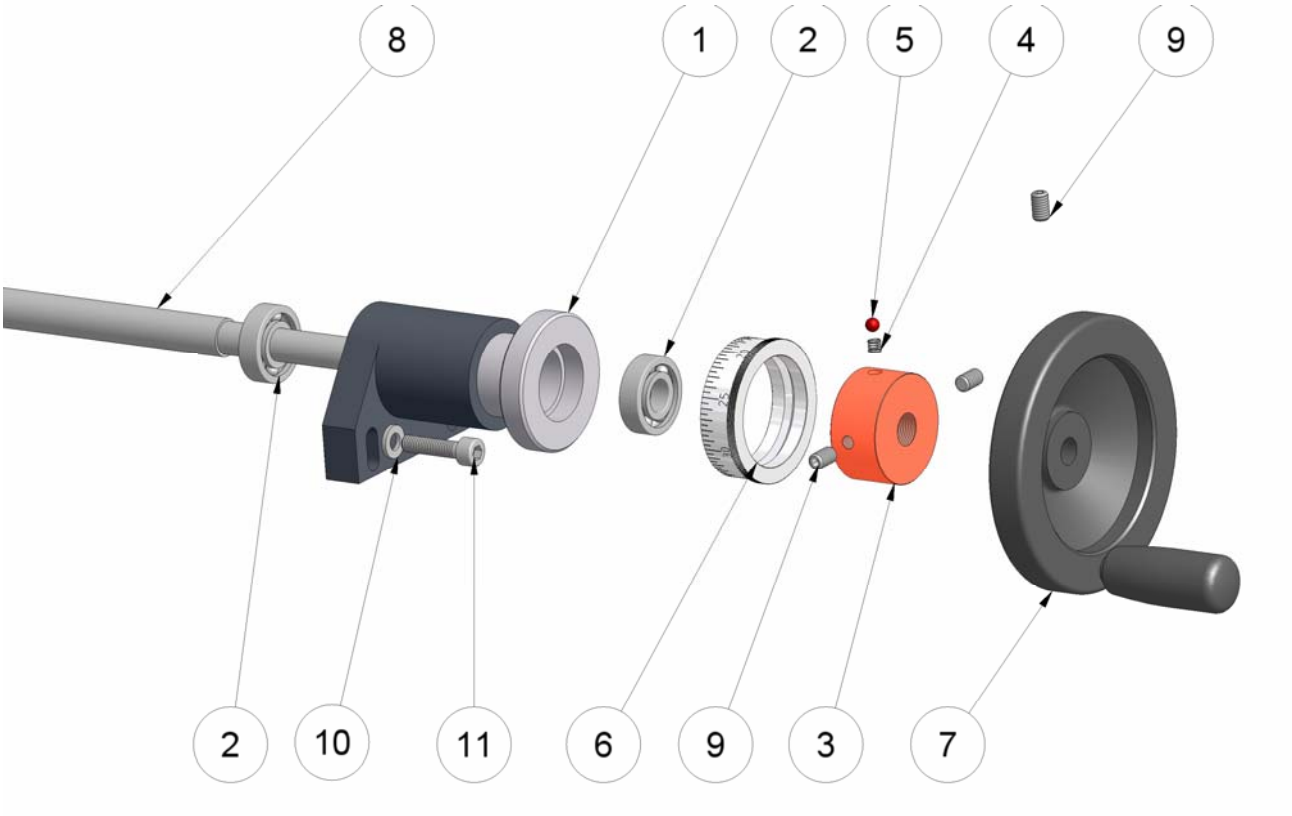


Part-No.	Pieces	Order-No.	Designation
1	1	112002103	Spindle bearing
2	2	11810007	Ball bearing
3	1	112002105	Adjusting ring
4	1	11850002	Spring
5	1	11810004	Ball
6	1	112002104	Scale ring (80 graduation marks)
			for milling machines with trapezoid thread spindle
	1	112452104	Scale ring (100 graduation marks)
			for milling machines with ball screw
7	1	11840005	Handwheel
			Milling machines with trapezoid thread spindle
8	1	11200206	Spindle *F1200 – F1200 high speed*
	1	11400206	Spindle *F1210 – F1210 high speed*
	1	16401206	Spindle *F1410LF – F1410 LF high speed*
			Milling machines with ball screw
	1	11245206	Spindle with Spindle nut *F1200 – F1200 high speed*
	1	11445206	Spindle with Spindle nut *F1210 – F1210 high speed*
	1	16400216	Spindle with Spindle nut *F1410LF – F1410 LF high speed*
9	3	11700087	Threaded pin
10	2	11700018	Washer
11	2	11700031	Screw

13. Drawing and list of parts

13.31 Y-spindle for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed – F1410 LF – F1410 LF high speed



13. Drawing and list of parts

13.31 Y-spindle for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed – F1410 LF – F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	112002103	Spindle bearing
2	2	11810007	Ball bearing
3	1	112002105	Adjusting ring
4	1	11850002	Spring
5	1	11810004	Ball
6	1	112002104	Scale ring (80 graduation marks)
			for milling machines with trapezoid thread spindle
	1	112452104	Scale ring (100 graduation marks)
			for milling machines with ball screw
7	1	11840005	Handwheel
			milling machines with trapezoid thread spindle
8	1	11200207	Spindle *F1200 – F1200 high speed*
8	1	11200207	Spindle *F1210 – F1210 high speed*
	1	16400207	Spindle *for transversal extension*
	1	16400207	Spindle *F1410LF – F1410 LF high speed*
			milling machines with ball screw
	1	11245207	Spindle with Spindle nut *F1200 – F1200 high speed*
	1	11245207	Spindle with Spindle nut *F1210 – F1210 high speed*
	1	11235207	Spindle with Spindle nut *for transversal extension*
	1	16400209	Spindle with Spindle nut *F1410LF – F1410 LF high speed*
9	3	11700087	Threaded pin
10	2	11700018	Washer
11	2	11700031	Screw

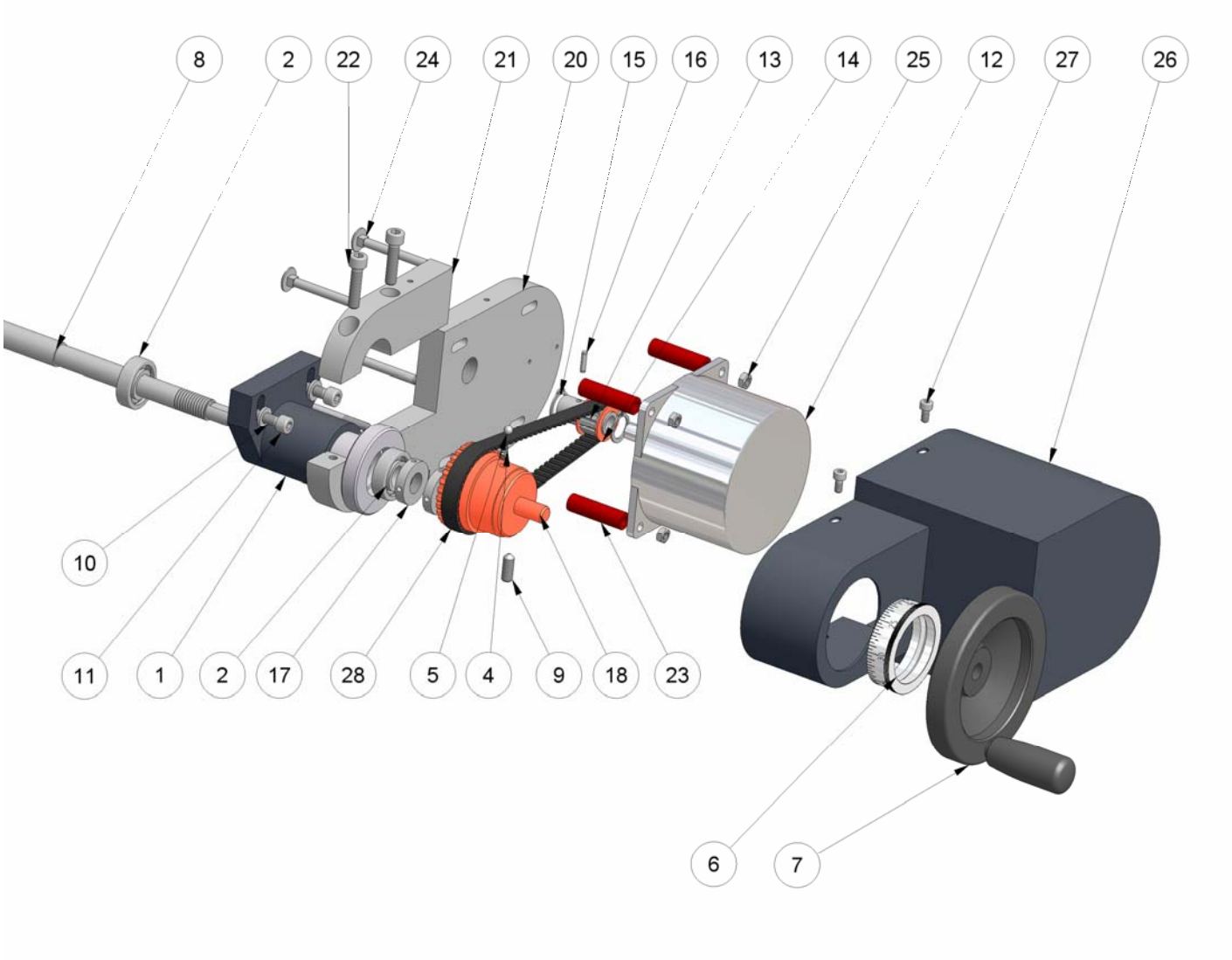
13. Drawing and list of parts

13.32 X-spindle for CNC milling machines

CC-F1200 – CC-F1200 high speed

CC-F1210 – CC-F1210 high speed

CC-F1410 LF – CC-F1410 LF high speed



13. Drawing and list of parts

13.32 X-spindle for CNC milling machines

CC-F1200 – CC-F1200 high speed

CC-F1210 – CC-F1210 high speed

CC-F1410 LF – CC-F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	112002103	Spindle bearing
2	2	11810007	Ball bearing
4	1	11850002	Spring
5	1	11810004	Ball
6	1	112002104	Scale ring (80 graduation marks)
			for milling machines with trapezoid thread spindle
	1	112452104	Scale ring (100 graduation marks)
			for milling machines with ball screw
7	1	11840003	Hinged handwheel
			milling machines with trapezoid thread spindle
8	1	11200206	Spindle *F1200 – F1200 high speed*
	1	11400206	Spindle *F1210 – F1210 high speed*
	1	16401206	Spindle *F1410LF – F1410 LF high speed*
			milling machines with ball screw
	1	11245206	Spindle with Spindle nut *F1200 – F1200 high speed*
	1	11445206	Spindle with Spindle nut *F1210 – F1210 high speed*
	1	16400216	Spindle with Spindle nut *F1410LF – F1410 LF high speed*
9	3	11700087	Threaded pin
10	2	11700018	Washer
11	2	11700031	Screw
12	1	11800003	Stepper motor *nccad basic*
	1	11800028	Stepper motor *nccad professional*
13	1	1121021213	Belt pulley
14	2	1121021212	Flanged wheel
15	2	11700048	Lock ring
16	1	11700049	Spiral pin
17	2	112003222	Adjusting nut
18	1	112102126	Toothed belt pulley
20	1	112102122	Motor support
21	1	112102123	Jam for motor support
22	2	11700115	Screw
23	4	112103195	Distance sleeve Stepper motor
24	4	11700047	Round-head screw
25	4	11700050	Nut
26	1	1121021217	Protective cover Stepper motor
27	4	11700026	Screw
28	1	11820003	Belt

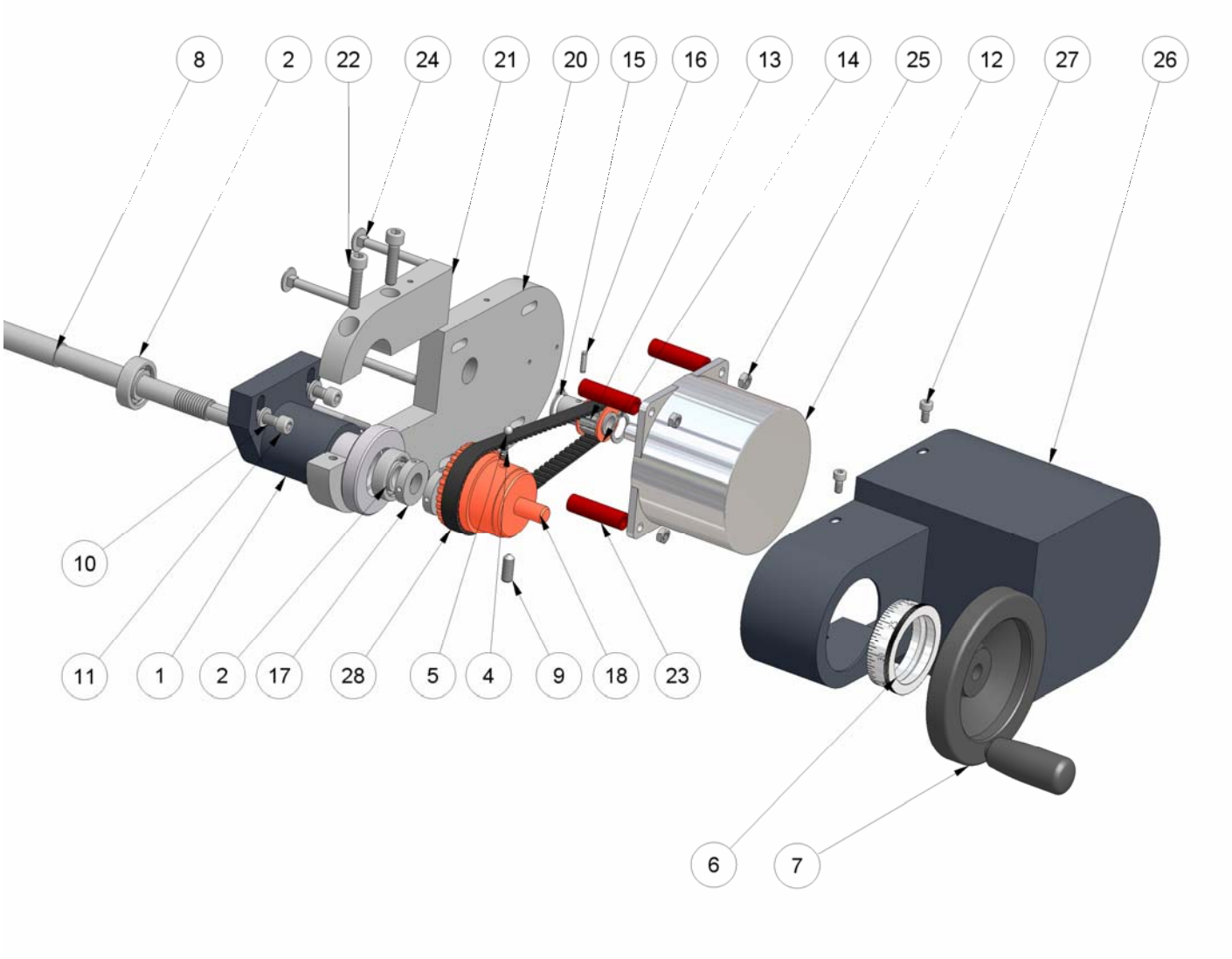
13. Drawing and list of parts

13.33 Y-spindle for CNC milling machines

CC-F1200 – CC-F1200 high speed

CC-F1210 – CC-F1210 high speed

CC-F1410 LF – CC-F1410 LF high speed



13. Drawing and list of parts

13.33 Y-spindle for CNC milling machines

CC-F1200 – CC-F1200 high speed

CC-F1210 – CC-F1210 high speed

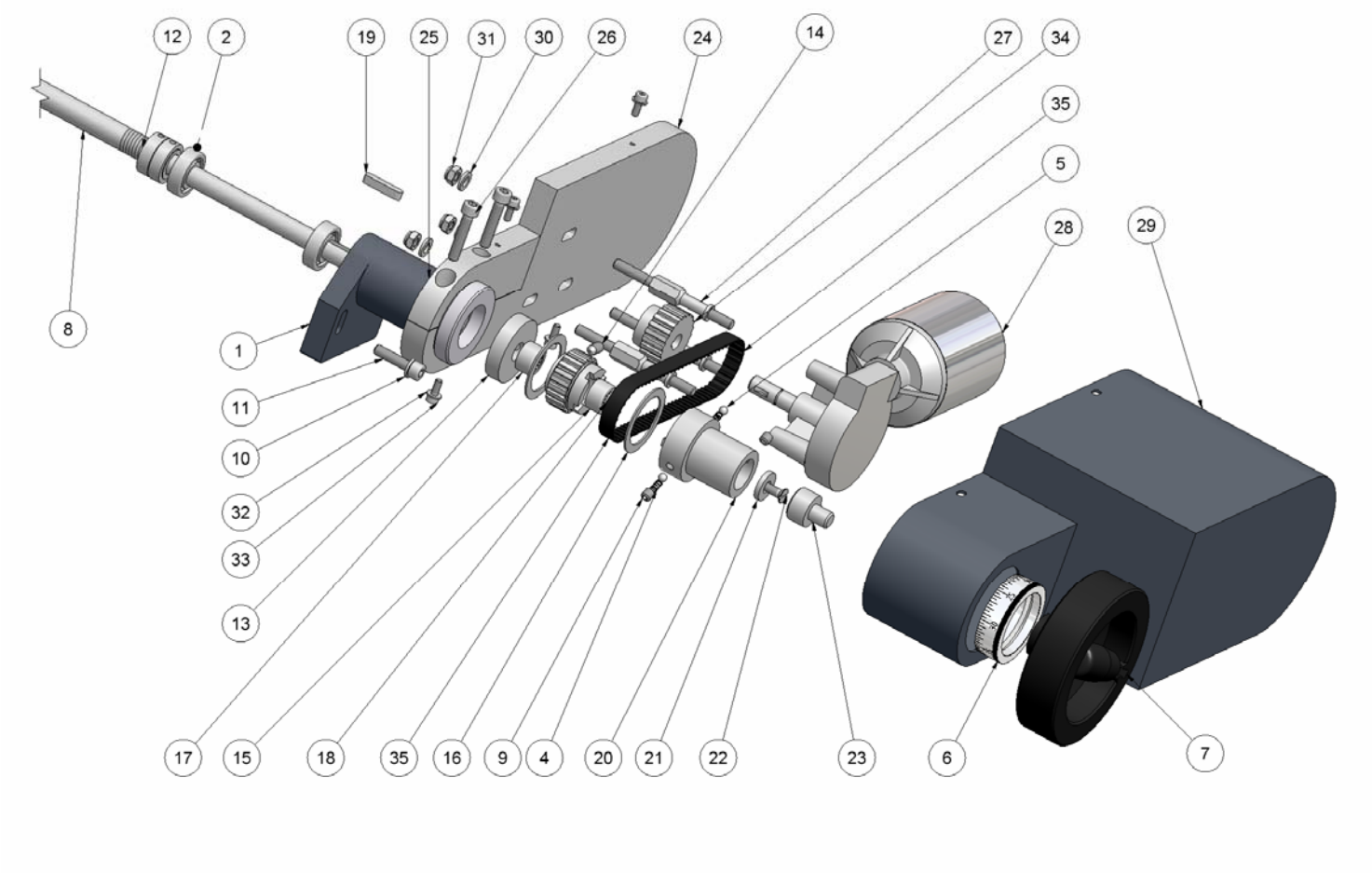
CC-F1410 LF – CC-F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	112002103	Spindle bearing
2	2	11810007	Ball bearing
4	1	11850002	Spring
5	1	11810004	Ball
6	1	112002104	Scale ring (80 graduation marks)
			for milling machines with trapezoid thread spindle
	1	112452104	Scale ring (100 graduation marks)
			for milling machines with ball screw
7	1	11840003	Hinged handwheel
			milling machines with trapezoid thread spindle
8	1	11200207	Spindle *F1200 – F1200 high speed*
8	1	11200207	Spindle *F1210 – F1210 high speed*
	1	16400207	Spindle *for transversal extension*
	1	16400207	Spindle *F1410LF – F1410 LF high speed*
			milling machines with ball screw
	1	11245207	Spindle with Spindle nut *F1200 – F1200 high speed*
	1	11245207	Spindle with Spindle nut *F1210 – F1210 high speed*
	1	11235207	Spindle with Spindle nut *for transversal extension*
	1	16400209	Spindle with Spindle nut *F1410LF – F1410 LF high speed*
9	3	11700087	Threaded pin
10	2	11700018	Washer
11	2	11700031	Screw
12	1	11800003	Stepper motor *nccad basic*
	1	11800028	Stepper motor *nccad professional*
13	1	1121021213	Belt pulley
14	2	1121021212	Flanged wheel
15	2	11700048	Lock ring
16	1	11700049	Spiral pin
17	2	112003222	Adjusting nut
18	1	112102126	Toothed belt pulley
20	1	112102122	Motor support
21	1	112102123	Jam for motor support
22	2	11700115	Screw
23	4	112103195	Distance sleeve stepper motor
24	4	11700047	Round-head screw
25	4	11700050	Nut
26	1	1121021217	Protective cover Stepper motor
27	4	11700026	Screw
28	1	11820003	Belt

13. Drawing and list of parts

13.34 X-spindle for automatic feed for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed– F1410 LF – F1410 LF high speed



13. Drawing and list of parts

13.34 X-spindle for automatic feed for milling machines

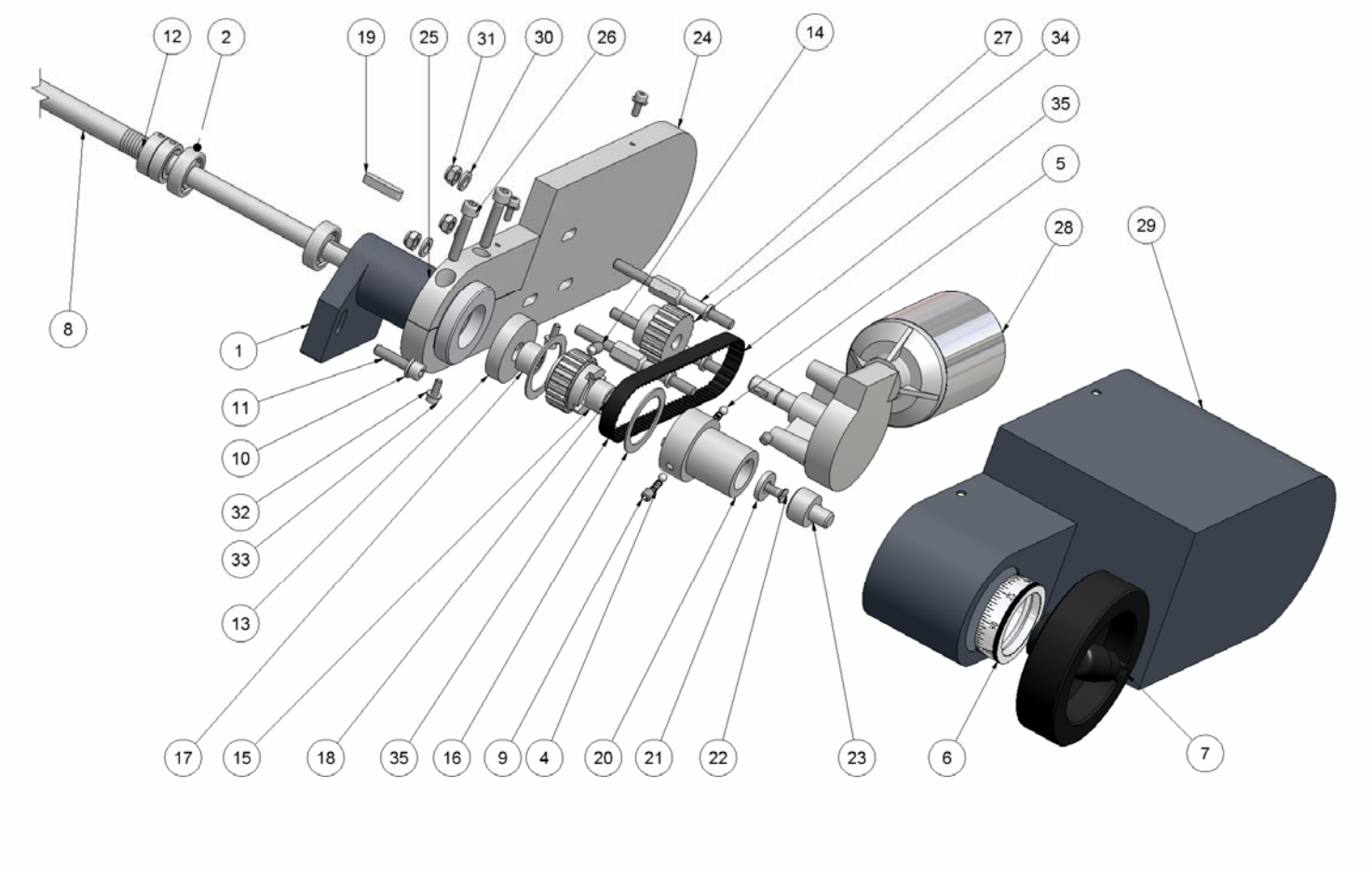
F1200 – F1200 high speed – F1210 – F1210 high speed– F1410 LF – F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	112002103	Spindle bearing
2	2	11810007	Ball bearing
4	1	11850002	Spring
5	1	11810004	Ball
6	1	112002104	Scale ring (80 graduation marks) *for milling machines with trapezoid thread spindle*
7	1	11840003	Hinged handwheel
8	1	11204002	Threaded spindle *F1200 – F1200 high speed*
	1	11404002	Threaded spindle *F1210 – F1210 high speed*
	1	16404002	Threaded spindle *F1410 – F1410 high speed*
9	1	11700087	Threaded pin
10	2	11700018	Washer
11	2	11700031	Screw
12	2	11204103	Adjusting nut
13	1	11204104	Thrust washer
14	1	11700087	Threaded pin
15	1	11204106	Belt pulley
16	2	11204105	Flanged wheel
17	2	11810027	Needle bearing
18	1	11700042	Lock ring
19	1	11700043	Feather key
20	1	11204108	Coupling
21	1	11204109	Connecting washer
22	1	17000130	Flat-headed screw
23	1	11204110	Handwheel extension
24	1	11204112	Motor support plate
25	1	11204113	Jam motor holder
26	2	11700046	Screw
27	3	11204111	Stud bolt
28	1	11800002	Motor
29	1	11204116	Protective cover
30	3	11700018	Washer
31	3	11700020	Nut
32	4	11700038	Washer
33	4	11700026	Screw
34	1	11204114	Belt pulley
35	1	11820003	Belt

13. Drawing and list of parts

13.35 Y-spindle for automatic feed for milling machines

F1200 – F1200 high speed – F1210 – F1210 high speed– F1410 LF – F1410 LF high speed



13. Drawing and list of parts

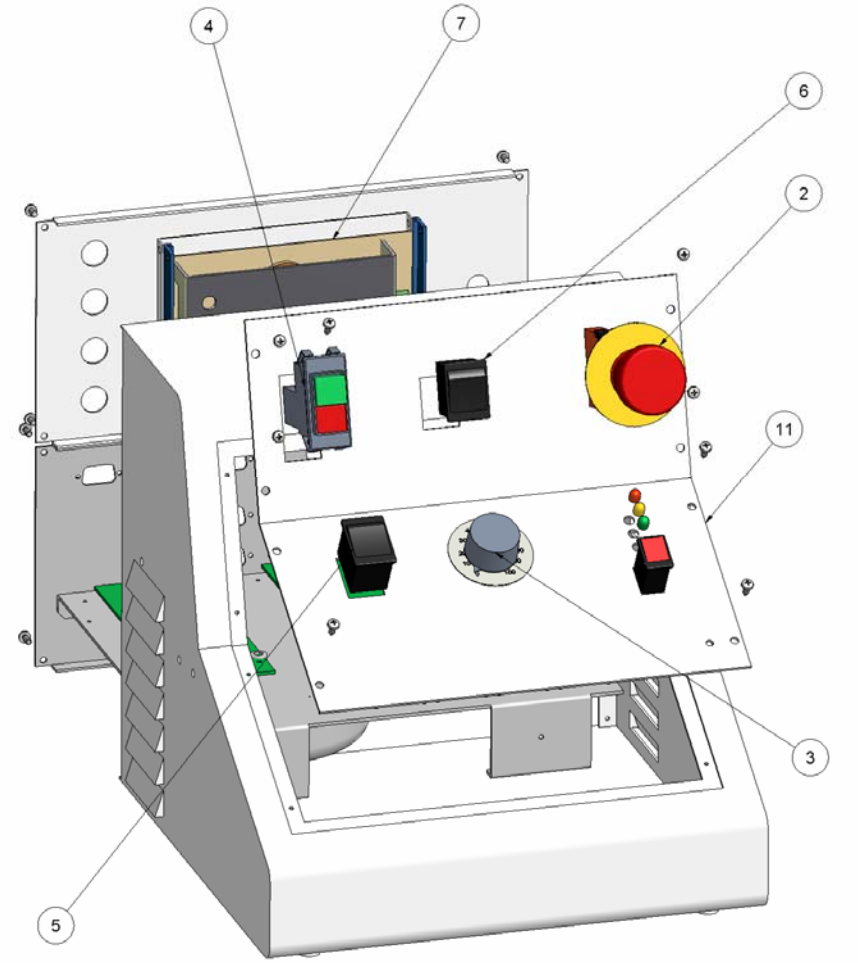
13.35 Y-spindle for automatic feed for milling machines

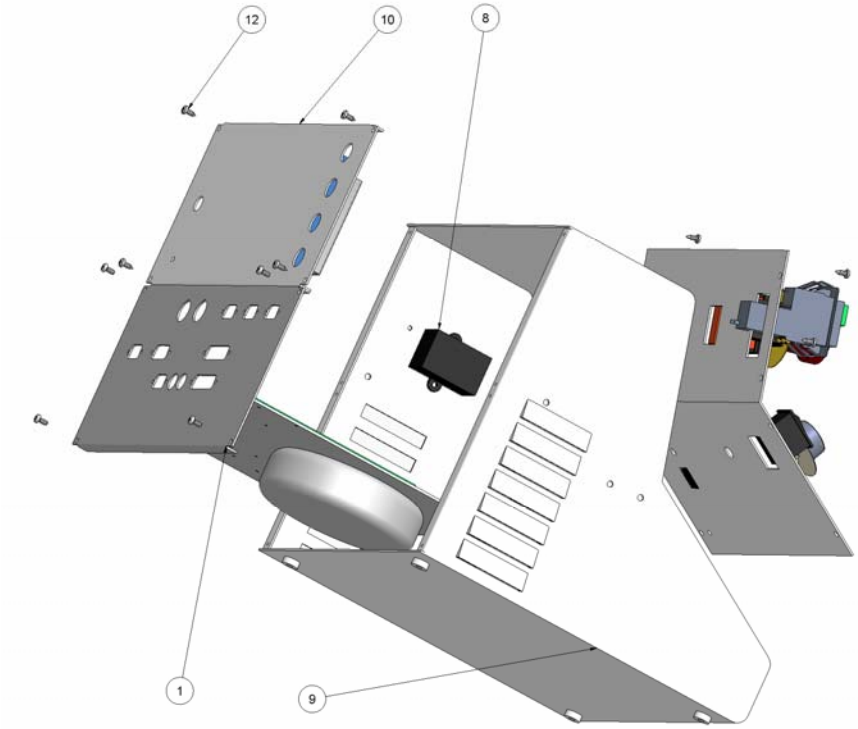
F1200 – F1200 high speed – F1210 – F1210 high speed– F1410 LF – F1410 LF high speed

Part-No.	Pieces	Order-No.	Designation
1	1	112002103	Spindle bearing
2	2	11810007	Ball bearing
4	1	11850002	Spring
5	1	11810004	Ball
6	1	112002104	Scale ring (80 graduation marks)
			for milling machines with trapezoid thread spindle
7	1	11840003	Hinged handwheel
8	1	11204001	Threaded spindle *F1200 – F1200 high*
8	1	11204001	Threaded spindle *F1210 – F1210 high speed*
	1	16404001	Threaded spindle *F1410 – F1410 high speed*
9	1	11700087	Threaded pin
10	2	11700018	Washer
11	2	11700031	Screw
12	2	11204103	Adjusting nut
13	1	11204104	Thrust washer
14	1	11700087	Threaded pin
15	1	11204106	Belt pulley
16	2	11204105	Flanged wheel
17	2	11810027	Needle bearing
18	1	11700042	Lock ring
19	1	11700043	Feather key
20	1	11204108	Coupling
21	1	11204109	Connecting washer
22	1	17000130	Flat-headed screw
23	1	11204110	Handwheel extension
24	1	11204112	Motor support plate
25	1	11204113	Jam motor holder
26	2	11700046	Screw
27	3	11204111	Stud bolt
28	1	11800002	Motor
29	1	11204116	Protective cover
30	3	11700018	Washer
31	3	11700020	Nut
32	4	11700038	Washer
33	4	11700026	Screw
34	1	11204114	Belt pulley
35	1	11820003	Belt

13. Drawing and list of parts

13.36 Control console nccad with 1.4 kW motor





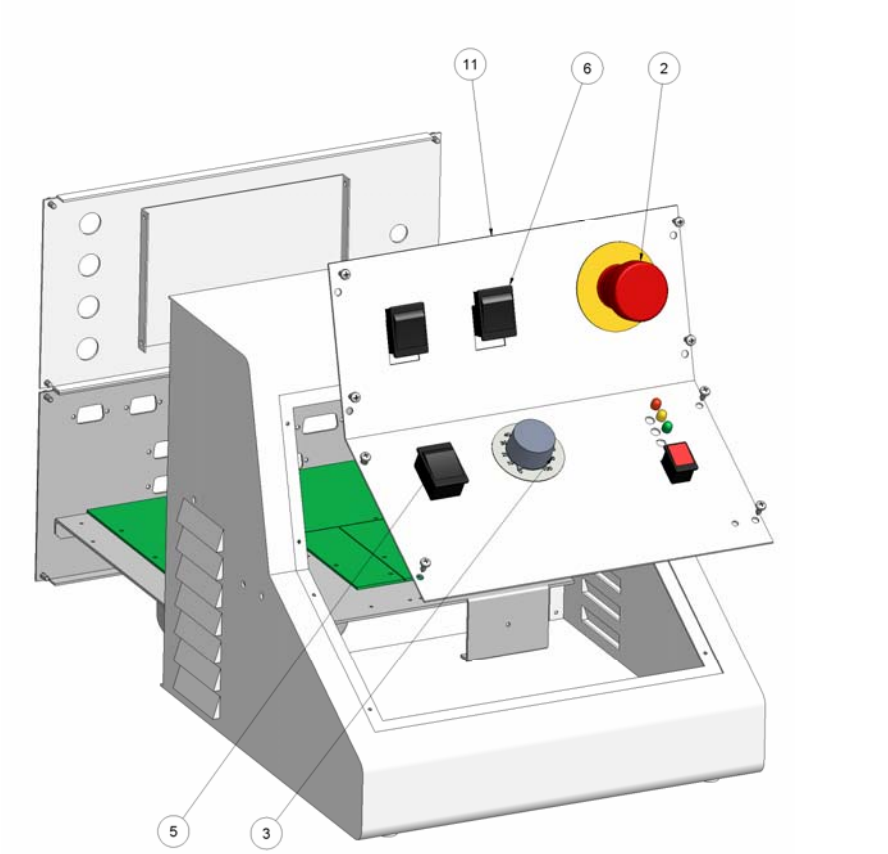
13. Drawing and list of parts

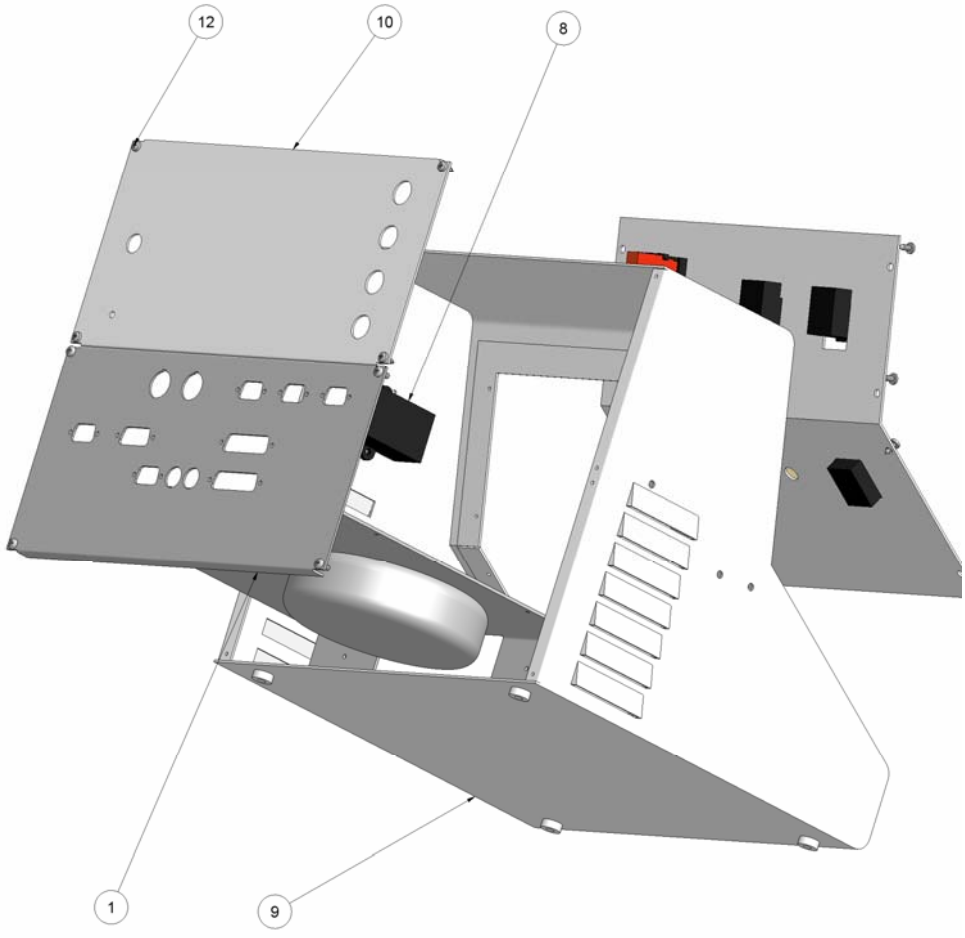
13.36 Control console nccad with 1.4 kW motor

Part-No.	Pieces	Order-No.	Designation
1	1		Control package nccad basic
	1		Control package nccad professional
2	1	11800008	Emergency OFF switch
3	1	11800004	Potentiometer
4	1	11800001	ON/OFF switch
5	1	11800021	Toggle switch
6	1	11800023	Toggle switch
7	1	11800005	Circuit board
8	1	11800030	Interference filter
9	1	11200504	Controller housing
10	1	11200509	Cap, top
11	1	11200513	Switch cover
12	16	11700003	Tapping screw

13. Drawing and list of parts

13.37 Control console nccad with 2.0 kW motor





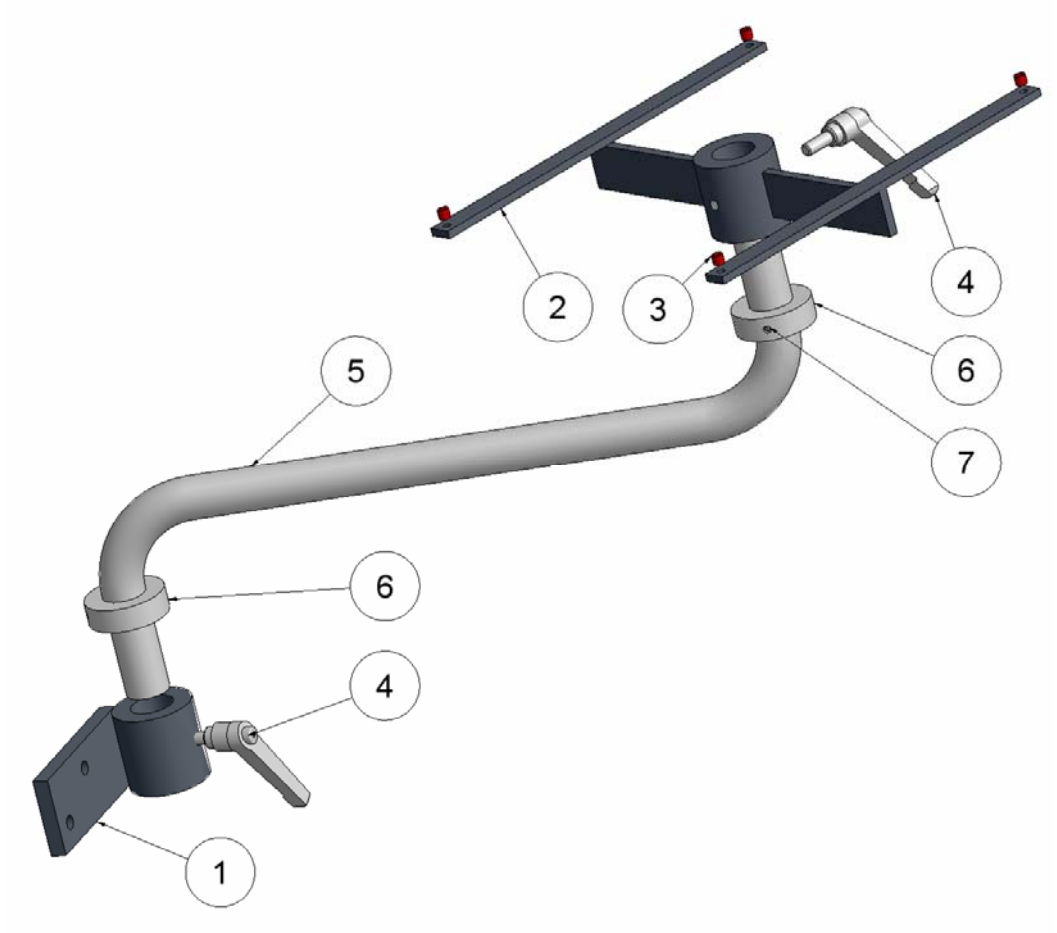
13. Drawing and list of parts

13.37 Control console nccad with 2.0 kW motor

Part-No.	Pieces	Order-No.	Designation
1	1	11800031	Control package Milling basic
	1	11800032	Control package Milling professional
2	1	11800008	Emergency OFF switch
3	1	11800026	Potentiometer
5	1	11800021	Toggle switch
6	2	11800023	Toggle switch
8	1	11800030	Interference filter
9	1	11200504	Controller housing
10	1	11200509	Cap, top
11	1	11200511	Switch cover
12	16	11700003	Tapping screw

13. Drawing and list of parts

13.38 Support arm for control console

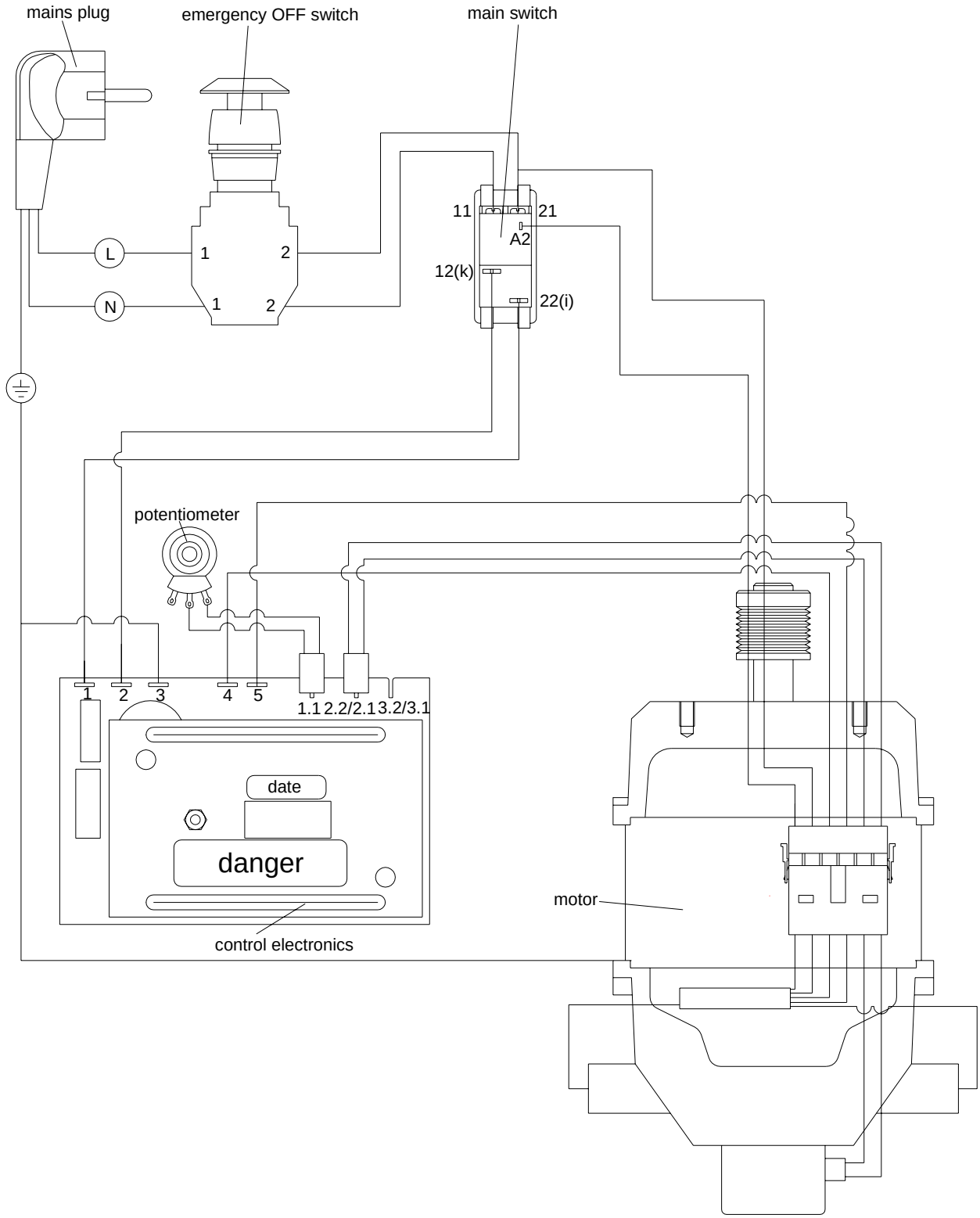


Part-No.	Pieces	Order-No.	Designation
1	1	16400501	Arm support
2	1	16400502	Arm support
3	4	16400503	Spacer
4	2	11840004	Clamping lever
5	1	16400500	Console arm
6	2	16400504	Ring stop
7	4	11700079	Threaded pin

14. Circuit diagram

14.1 Motor 1.4 kW

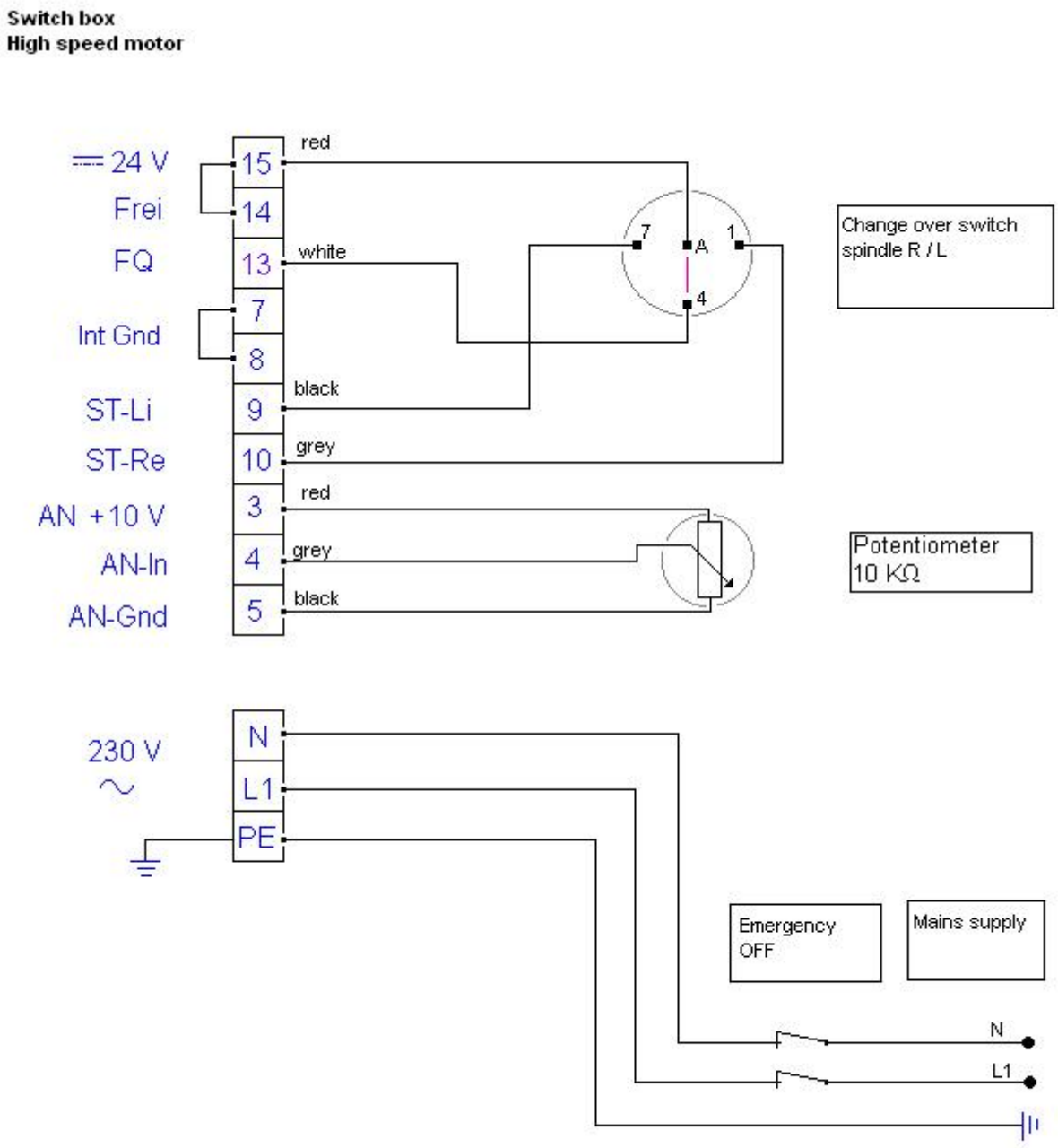
This document shows all units of the electrical equipment
including the mains connection



14. Circuit diagram

14.2 High speed motor 2.0 kW

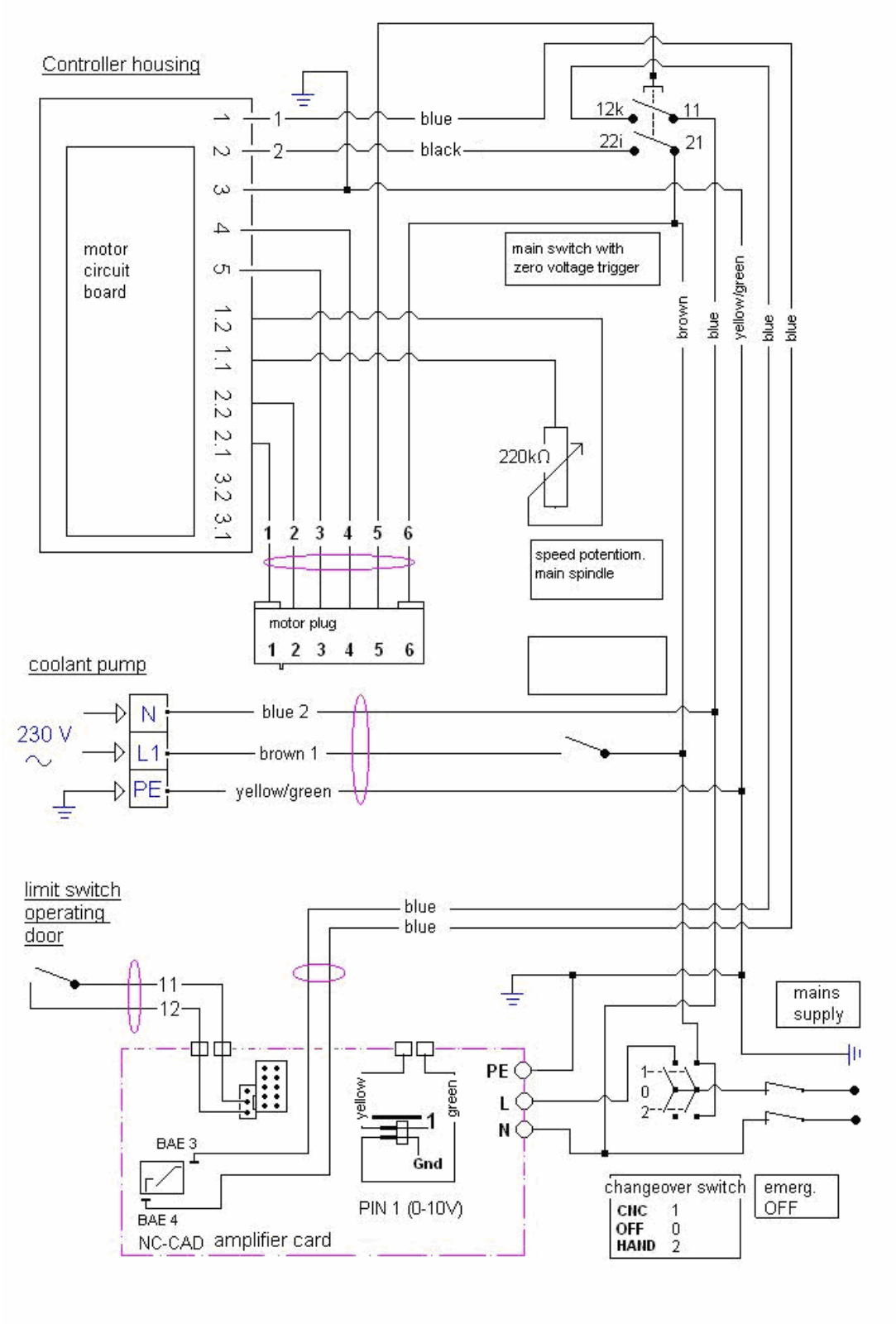
This document shows all units of the electrical equipment
including the mains connection



14. Circuit diagram

14.3 nccad with 1.4 kW motor

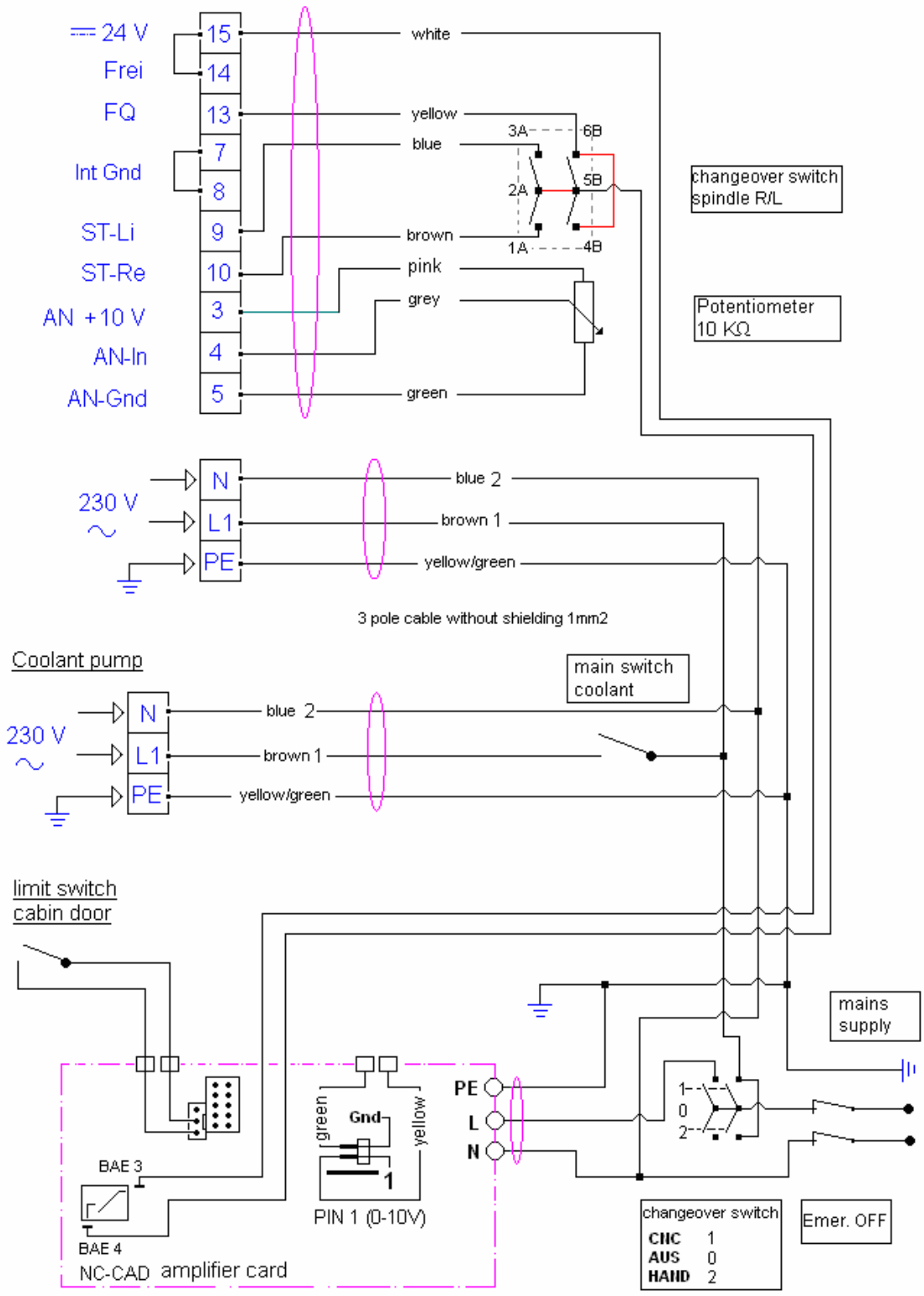
This document shows all units of the electrical equipment including the mains connection



14. Circuit diagram

14.4 nccad with 2.0 kW motor

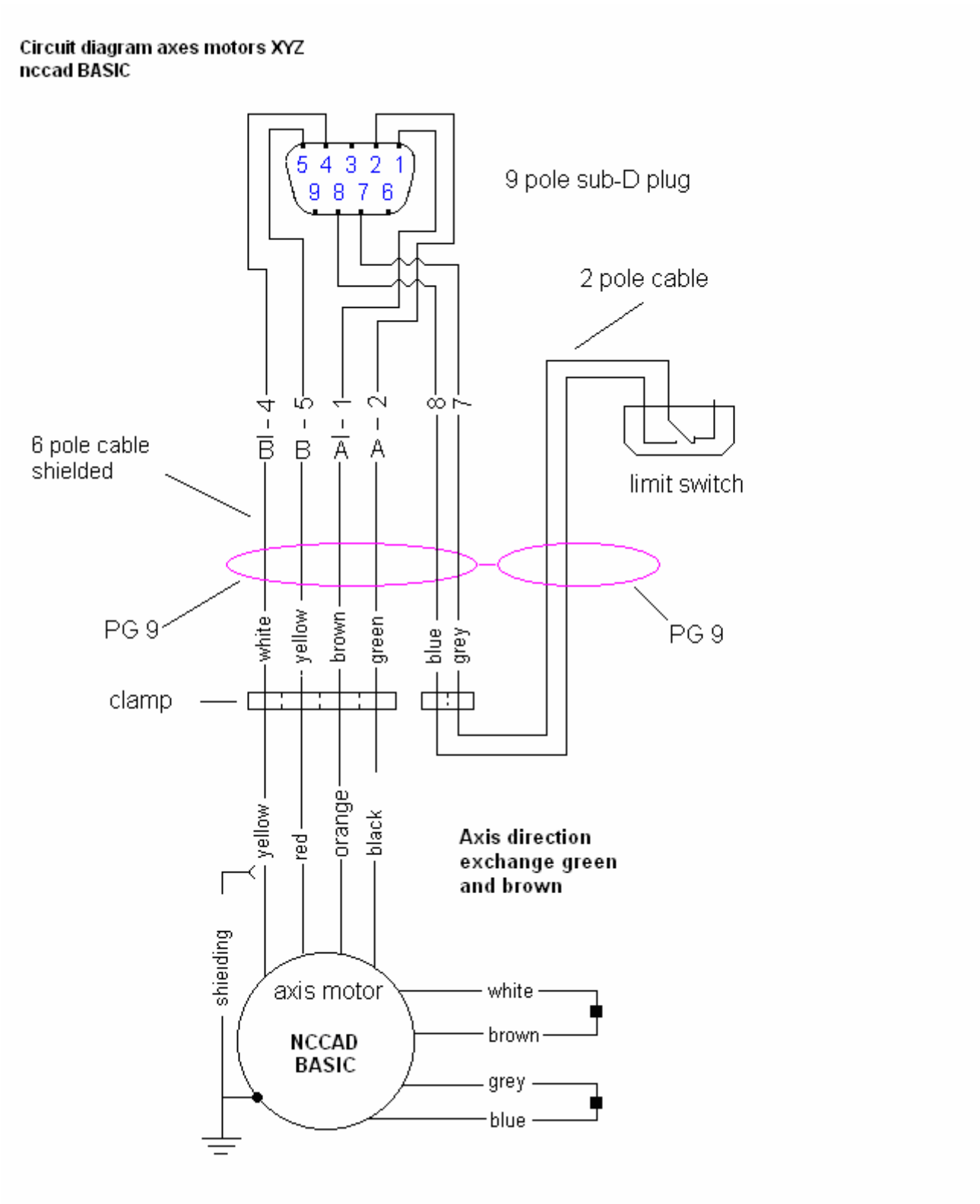
This document shows all units of the electrical equipment
including the mains connection



14. Circuit diagram

14.5 Stepper motor basic version

This document shows all units of the electrical equipment
including the mains connection



14. Circuit diagram

14.6 Stepper motor professional version

This document shows all units of the electrical e
including the mains connection